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A CURIOUS MODE OF TAKING TURTLE.

In the neighborhood of Cuba a peculiar method of securing the turtle is pursued by the natives, advantage being taken of the habits of a species of remora, or sucking fish, peculiar to those waters. Three or four species of remora are known, having collectively a wide range. The white tailed remora (*Echeneis albicauda*, Mitch.) frequents our North Atlantic coast, and is sometimes taken in Long Island Sound, where is it known as the shark sucker.

The chief peculiarity of all these fish consists in an oval disk on the top of the head and the adjacent parts of the back, the surface of which is crossed by transverse cartilaginous plates, arranged somewhat like the slats of a Venetian blind; on the middle of the under surface are hook like projections, connected by short bands with the skull and vertebræ, and their upper margin is beset with fine teeth. According to De Blainville, this organ is an anterior dorsal fin, whose rays are split and expanded horizontally on each side instead of standing erect in the usual way. By means of this apparatus, partly suctorial, partly prehensile by the hooks, the remora attaches itself to rocks, ships, floating timber, and the bodies of other fish, especially sharks, which it uses either for anchorage or for labor saving transit.

The species of remora inhabiting Cuban waters (called Revé, that is, reversed, by the Spaniards, because its back is usually mistaken for its belly) is employed by the native fishermen in the curious manner shown in our illustration. The boatmen in quest of the turtle carry several revés in a tub, and when they approach their game a properly tethered revé is cast off. On perceiving the turtle the fish quietly attaches itself so firmly that the prize can be easily secured.

Colcomb states that the fish's hold is so strong that it will allow itself to be torn asunder without letting go. This living fish hook is held by means of a ring attached to the remora's tail, and a stout line made of the fiber of palm bark. By a peculiar manipulation the fish is induced to let go its hold upon the turtle when both have been hauled into the boat. The remora is then returned to its tub, to await the discovery of another turtle.

In some parts of Algeria steam plowing has resulted in an increase of 50 per cent. in the yield of wheat.

The Trouble with English Cottons.

In an address to his constituents touching the condition of the cotton trade, Mr. Mellor, member of Parliament, lately said that the trade had gone down because of the rascality practiced in the English manufacturing districts. In support of the charge he told a story brought out by a recent county court case at Rochdale. A suit had been brought to recover a sum of money "for sizing 27 warps" for the defendant, a cotton manufacturer. The judge did not understand what "sizing" meant. He asked for an explanation. The plaintiff asked that the court might be cleared while he answered the judge. He was evidently ashamed of the business. The judge would not comply with his request, and he had to explain that "sizing" was "loading" or adulteration of cotton goods. The size consisted of flour, China clay, Epsom salts, chlorate of zinc, chlorate of magnesia, and glue. This was put into the cotton to the extent of 70 per cent, and he had used the size to as high an average as 130 per cent. Indeed, he confessed that there were manufacturers who adulterated their goods with this size as much as 230 per cent. When the witness first commenced business, 20 years ago, he said flour alone was used for sizing, in the proportion of 1 to 20, or about 5 per cent.

Mr. Louis J. Jennings tells, in a recent letter from London to the New York *World*, a story which aptly supplements Mellor's:

"A lady friend of mine was told to-day, on inquiring for some calicoes for children, that the 'Americans were the best—they could be worked on the sewing machine more easily than the English.' 'Why?' 'Well, they are softer.' The English goods are stiffened up with size, and consequently do not lend themselves very readily to the sewing machine.'

"When English shopkeepers talk like this," adds Mr. Jennings, "all Mr. John Morley's theories count for very little. In art work, also, American firms are making good headway."

Remarkable Photographs.

At a recent session of the Berlin Association for the Promotion of Photography, among other specimens of photography exhibited, were some remarkable landscape pictures by Herr Holtermann, of Sydney, Australia. These are more especially distinguished for their size; they are mounted on an endless band of paper strengthened with linen, nearly 100 feet long. Two colossal panoramas of Sydney and Melbourne have been each made from about a dozen sheets, 18 by 20 inches, very skillfully joined together; the separate parts harmonize very completely in drawing, tone, and depth. The last on the list was a picture which, as could easily be seen, had been printed from a single negative, and its size, 150 by 93 centimeters, showed it to be quite an uncommon photographic feat.

An Insoluble Cement.

A very valuable cement has been discovered by Mr. A. C. Fox, of which details are published in *Dingler's Polytechnisches Journal*. It consists of a chromium preparation and isinglass, and forms a solid cement, which is not only insoluble in hot and cold water, but even in steam, while neither acids nor alkalies have any action upon it. The chromium preparation and the isinglass or gelatin do not come into contact until the moment the cement is desired, and when applied to adhesive envelopes, for which the author holds it to be especially adapted, the one material is put on the envelope covered by the flap (and therefore not touched by the tongue), while the isinglass, dissolved in acetic acid, is applied under the flap. The chromium preparation is made by dissolving crystallized chromic acid in water. You take:

Crystallized chromic acid..........	2·5 grammes.
Water..............................	15 "
Ammonia...........................	15 "

To this solution about 10 drops of sulphuric acid are added, and finally 30 grammes of sulphate of ammonia and 4 grammes of fine white paper. In the case of envelopes, this is applied to that portion lying under the flap, while a solution prepared by dissolving isinglass in dilute acetic acid (1 part acid to 7 parts water) is applied to the flap of the envelope. The latter is moistened, and then is pressed down upon the chromic preparation, when the two unite, forming, as we have said, a firm and insoluble cement.

An Evener, provided with rubber blocks placed in recesses for the clevis and hammer bolts to rest against, has been patented by Mr. M. O. Smith, of Chenango Forks, N.Y.

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(Illustrated articles are marked with an asterisk.)

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THE SCIENTIFIC AMERICAN SUPPLEMENT

No. 156.

For the Week ending December 28, 1878.

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THE END OF 1878.

With this number we close the thirty-ninth volume of the SCIENTIFIC AMERICAN, and with it the record of the year's events.

Does that record contain anything that will make 1878 a notable year in the calendar of the century? What are the claims of the year to the respect and memory of the future?

That a war in Europe has ended, and one in Asia begun; that Europe is still suffering financial and industrial depression, while our more favored land is well advanced toward a solid prosperity greater than we have known before; that the much talked of socialistic uprising in America has ended in talk, while in Europe that conspiracy against civilization remains a source of national peril; that we have enjoyed harvests of unrivaled bountifulness, while other regions—in South America, North Africa, India, and China—have been smitten with drought and famine. These occurrences, however big with importance to the present dwellers upon earth, will but faintly interest humanity in 1978, and have but small effect probably upon the world's welfare in future ages. Possibly some obscure inventor, perhaps so poor that he is troubled to raise money enough to pay his patent fees, may have developed some thought or discovered some principle that will influence the future more than all these great events together, which will do more to signalize the year just ending than the achievements of all other men combined. It may be that discoveries, now well known but little esteemed, contain the germs of scientific, social, and industrial revolutions. It is quite possible too that those recent discoveries and inventions, to which the world is looking for the grandest results, will quickly fade into comparative insignificance. Every age is blind to the elements of its own greatness; and, as a rule, the unheralded achievement is the one that after-ages chiefly magnify.

But, to drop philosophy for fact, what, that is specially noteworthy from the standpoint of the present, has been done during the past year? It has been a year of great activity in almost every region of effort. The outposts of every science have been more or less advanced, and the main army of occupation, pressing into regions of the unknown and the obscurely known, has moved forward perhaps as steadily as during any year of the past; yet few events stand out with special prominence, very few promise to open up new lines of research, new fields of industrial enterprise, or new interpretations of the phenomena of nature.

No striking geographical or geological discoveries have been made—unless we admit the caverns of Luray—and no extraordinary engineering enterprises have been begun or finished, with the single exception, perhaps, of the transference of Cleopatra's Needle from the bank of the Nile to that of the Thames. In mechanics, inventions and improvements have been many and valuable; yet we fail to recall one that is radically novel. If the magnetic motor people dispute the assertion, we shall be happy to retract it on the submission of proof of their claims. In physics, the microphone has made much noise out of little; but that interesting toy cannot justly be accredited to 1878. Mr. Edison's microtasimeter promises to rank among the most powerful and valuable of scientific instruments for exploring the secrets of nature; but with the exception of its use in measuring the heat of stars and that of the sun's corona, its revelations are prospective. The solar eclipse of July 29, which was made notable by the first public employment of the tasimeter, is notable also for the opportunity it afforded for demonstrating the existence of one or more intra-Mercurial planets, first seen by American astronomers. The discovery of an active crater in the moon by Dr. Hermann Klein seems to prove that volcanic energy is still at work on our satellite; an inference very strongly corroborated by the later observations of Mr. Hammes, described in the SCIENTIFIC AMERICAN last week.

During the latter part of the year the excitement in regard to the progress of the electric light presents a notable feature of the year's record. Apparently this is at present the field of greatest speculative and practical activity. The use of electric illumination is spreading rapidly, and there are on all sides promises of the speedy practical solution of the great problem. As yet, however, with the exception of the Sawyer-Man lamp, no device which seriously threatens the supremacy of illuminating gas has been made public.

The fairly successful Exhibition at Paris, however important in its time, presented no feature or achievement to give it lasting fame. The duplexing of the Atlantic cable marks but a step, though an important one, in a familiar path of progress. The same may be said of the discovery of one or two new metals in chemistry, and the successful synthesis of indigo. The recent claim of Mr. Lockyer that he is convinced of the essential oneness of the elements, and is able to demonstrate that all matter is fundamentally the same, is much more likely to mark an era in the history of science—if it turns out to be true; and a century hence it may be the best known achievement of 1878.

PATENT SUITS.

A patent suit is now in progress between the "Tubular Lantern" and the "Buckeye Lantern" Companies, in which some interesting questions come up for consideration. The Tubular Lantern Company own a patent in which air is received into an annular chamber surrounding the chimney above the globe, from whence it passes through two pipes extending downward to another air chamber beneath the burner, and from thence to the flame to keep up combustion. The products of combustion as they rise through the chimney draw in air from the lower air chamber, which is supplied mainly as indicated above, and by this means a constant supply of pure air is kept up to the burner. On top of the chimney are "deflecting plates," arranged to act as an ejector when a current of air strikes the lamp, and on the air chamber are similar deflecting plates, which act as an injector, by which means the equilibrium of the air pressure is kept up, and the flame is thus prevented from being extinguished under an ordinary wind.

In the Buckeye lantern, manufactured at Bellaire, O., there is no chamber around the chimney, and no pipes to carry the air downward; but there are two globes, one within the other, so combined with the framework of the lamp that the air for the support of combustion is taken from the space between the globes, which is open at top to admit fresh air, except for a plate (similar to the reflector in ordinary lanterns) which is set a little above the opening, and which is stated by the counsel for the complainants (Mr. Thacher, of Chicago) to act as an injector to force air into the space between the globes, and in this he is borne out by the testimony of the complainant's expert. The defendant's counsel (Col. Dyer, of Washington, D. C.), takes the contrary ground that the plate referred to is nothing more than an ordinary reflector, and that even if the space between the globes is the equivalent of the annular air chamber in the complainant's patent, the reflector is in no sense an injector, in which he is supported by the testimony of the defendant's experts, who testify unqualifiedly that the reflector acts rather as an ejector than as an injector, and claim that they can prove this by actual tests.

It will be seen from the above that there is a great difference in the construction of the lanterns, and that this difference causes considerable variation in the mode of operation of the two, inasmuch as in the "Tubular" lantern the equilibrium of pressure is kept up by two columns of air traveling at fast speed through small pipes, while in the "Buckeye" the air is taken from the chamber between the globes, which is of such capacity as to form a column of air counterbalancing that in the flame chamber, by which means an equilibrium is kept up, which, from the large source of supply, is not so easily affected by extraneous currents, and hence needs no injector to regulate or increase the influx. From this difference of construction and operation it is argued that the annular air chamber in one and the air reservoir in the other cannot be considered an equivalent for each other even if the same end is served by both, and that as the reflector does not force air into the reservoir, it cannot be the equivalent for the "deflecting plates" of the "Tubular" lantern, which is the main point in controversy, as lanterns having air chambers and tubes, substantially like those in the "Tubular," were known long before the invention of complainant's lantern.

The introduction of the lantern in controversy in this suit—the "Buckeye"—shows what can be done with a good invention, even if times are bad and money scarce. The company owning this patent have only been in operation a short time, and yet their sales of this lantern have of late averaged about 2,500 dozen per month, giving employment to about 150 hands, and distributing a large amount of money among a class of people sadly in want of it.

A number of suits, upwards of thirty, we believe, have been commenced against different manufacturers and dealers in "barbed wire fences," by Messrs. Coburn & Thacher, acting for the Washburn & Moen Manufacturing Company, and I. L. Ellwood, who claim to hold patents covering the manufacture of barbed wire fence of any form. The defense set up is previous use, the defendants alleging that a barbed wire fence had been used some twenty years ago in Texas and Missouri. It would appear, however, that this point is doubted by the complainants, who bring a large number of witnesses to prove that such a fence had never been used in the places specified, and that no one except the witnesses for the defense, of which, however there are many, ever knew of such a fence having been made or used, and that at the best, even if it is admitted that such a fence was made, it could only be considered as an abandoned experiment, or as a "lost art," like the Connor safe, in the Fitzgerald case.

THE SCIENTIFIC AMERICAN AS AN EDUCATOR.

It is becoming more and more the custom of manufacturers to express their approval of the SCIENTIFIC AMERICAN, and their desire to benefit their employés by presenting the latter with annual subscriptions to this paper. We are assured that the practice is directly profitable to the givers in increasing the kindliness of the relations between the employer and the employed, and also—more materially—in augmenting the skill and intelligence of the recipients of the gift.

We are indeed very frequently in receipt of letters from readers of the SCIENTIFIC AMERICAN—both employers and employed—expressing their indebtedness to it for very much of their skill, intelligence, and success in life. Not unfrequently men write saying, "I am foreman of So & So's shop," or, "I am proprietor of such or such an establishment," or, "I am the patentee of this, that, or the other successful invention, and I owe everything to the suggestions, information, and practical habits of mind acquired in the diligent perusal of the SCIENTIFIC AMERICAN." We need not say that such letters are extremely gratifying to us, while they intensify our desire to make the paper more and more worthy of its readers' approval.

As an illustration of the advantage which may accrue not

only to the reader of the SCIENTIFIC AMERICAN, but to his employer as well, we venture to reproduce a portion of a communication just received from a neighboring city, suppressing only such parts as would betray the confidence of the writer and his unfamiliarity with the spelling book. The directness, force, and eloquent sincerity of the story could not be improved by the most skillful rhetorician. The writer says:

"A few years ago I had the fortune to be placed over the machinery department of a firm in this city. I was to fill a position until then occupied by a man of intellect and experience. I was nineteen years old, and addicted to many of the evil habits of young men of that age. I was pursuing a useless and unprofitable career, both to the disadvantage of myself and those around me. I managed to keep my position, and also to keep the work up to the mark of former years, in the matter of cost and amount manufactured. Two years passed. The machinery was getting very badly impaired. I knew I could not keep up the work if the machinery was not repaired properly. I yearned for some means by which I could find out the wanted information. I inquired of a newsdealer for some work on machinery, but having none, he sent me a copy of the SCIENTIFIC AMERICAN, which, he said, would give me the information I wanted. My joy was overshadowed when I perused its pages without understanding what I was reading about. That gives you the limit of my education at that time. I read it again, and a beam of enlightenment came over my senses. I tried it again and again. I believe I read that copy twenty-five times, jumping from one article to another, or to the one I thought I was most likely to derive some information from, each time bringing a new and encouraging result. I became a subscriber through the newsman, and have never missed a copy since.

"What is the result? I will try to tell in part, as no man living can tell all. There is an increase of 20 per cent in the amount of stock turned out, and a large increase in the demand for our manufactures. . . . There is a saving of one third in the expense of articles pertaining to the manufacture that is, in belting, oil, etc. The help get better wages and steadier employment than ever before. . . . . In fine, the firm are in a fair way of becoming as well known as the SCIENTIFIC AMERICAN, to which I owe all the advantages I have gained, both in relation to my private and public career. I now superintend the entire manufacture, and have charge of the whole inside business, as well as the machinery department."

Our readers will pardon the length of the citation for its real merit. It is but one of a multitude of instances which have come to our knowledge, of young men of inherent force, but untrained and ignorant, who, through a new life of thoughtfulness and study aroused and sustained by the weekly instructions and suggestions of the SCIENTIFIC AMERICAN, have developed rapidly and profitably to themselves and their employers. In every workshop will be found rough diamonds of this sort, possibly wasting their time and strength in dissipation and thoughtlessness, with whom a subscription to the SCIENTIFIC AMERICAN might work wonders. Many employers have assured us that it pays them to provide the paper for such workmen. It is not a costly experiment to try, at all events; and, in view of communications like the foregoing, we may be pardoned the suggestion that the experiment be more generally tried.

THE NATIONAL OBSERVATORY.

Notwithstanding the observations of the numerous celestial phenomena which have occurred during the year about closing have somewhat interfered with the regular work of the Observatory, yet a large amount of it has been done, and the observations of the year are now being reduced. During the year the 26 inch equatorial, under the charge of Professors Hall and Holden, has been pretty constantly employed in observing satellites, nebulæ, and comets. The optical power of this instrument is very fine, and was much praised by the foreign astronomers who visited it during the past year, but they considered its mounting as too light, and the justice of this criticism is shown in slight tremors in right ascension, though observations show that during the last five years the pole of the instrument has changed but the fraction of a minute of arc. Some changes, however, will have to be made, as the heavy dome makes it difficult to revolve. The continued observations of the ring and satellites of Saturn, which were made until the planet approached too near the sun, prove that Bessel's elements of the ring are very nearly correct. Frequent observations were made of the satellites of Mars, Uranus, and Neptune, and an unsuccessful search made for a satellite to Venus.

The thirty double stars selected by Otto Struve, of Pulkowa Observatory, for the determination of personal errors, were observed by Professor Hall, each star being observed six nights on an average. The different combinations of the angles and the distances of the stars in the trapezium of Orion were measured first with bright wires in a dark field, and then with dark wires in a bright field, six times by each method, and an adjustment of the measurements effected by the method of least squares. Sirius and its companion have been carefully observed with a view of settling the question whether the companion produces the variable proper motion of Sirius.

Nearly 3,500 observations have been made by Professors Eastman and Frisby and Assistant Astronomers Skinner, Paul, and Pritchett, with the transit circle. The work of this instrument for former years has been prepared for publication, but owing to lack of funds its printing is delayed. The 221 photographs taken by the transit of Venus parties in 1874 have been measured by Professor Harkness for the corrections of minute errors, such as were due to the shrinkage of the collodion and like causes. The observations of the transit of Mercury and the total solar eclipse have been compiled in detail, and their computation and reduction are now going on. The publications of the Observatory have been freely distributed to other observatories, institutions, and astronomers, and numerous valuable additions to the library have been received in exchange.

AN AMENDMENT TO DISCOURAGE INVENTION.

It is to be hoped that before final action is taken upon Mr. Wadleigh's bill for the revision of the Patent Law (Senate Bill 300), more particular and searching inquiry will be made with regard to the probable effect of Section 11. As it stands, this section provides that, in addition to the fees collected when a patent is applied for and when it is issued, there shall be paid to the Commissioner a duty of fifty dollars at the end of the first four years, and another duty of one hundred dollars at the end of the second four years, after the patent is issued; thus increasing the cost of patents more than fivefold. The failure of either of these payments it is further provided, will make void the patent. There are two very strong reasons why this section should not be adopted as part of the patent law.

In the first place, the patent system is already more than self-sustaining, the receipts from existing fees largely exceeding the cost of maintaining the Patent Office; and there is no good reason why the United States Government should seek to increase its revenues by laying a special tax upon inventors. Besides, the patent fees are sufficiently burdensome already. If any change is made in them they should rather be reduced, as they could be materially without diminishing in any way the efficiency of the office.

In the scond place, the assumption on which the proposed amendment is based is altogether fallacious. It is said that a great many patents are worthless. They are never developed. Yet they stand in the way of industrial progress, in that they prevent the use of the idea or device they cover in a more practicable way; or they are made the basis of claims for damages when other men have introduced the idea successfully. In all such cases, however, it is the man that has invaded, or that wants to invade, a patent right, not the owner of it, who is desirous of having such a patent condemned and killed. But that is apart from the point at issue. It is said that there are a great many worthless patents that ought to be put out of the way; and that it can be done most readily by levying the proposed duties. If a patent has any value at all, say the advocates of this change, it will be more than worth paying for; and four years is ample time for demonstrating the worth or worthlessness of any invention. All this is inconsistent with fact and experience. The more novel an invention is the less the likellhood of its being immediately profitable. Indeed, the speedy development of a strikingly useful invention is quite exceptional; and with the average of inventions the time that elapses before they are assuredly profitable is oftener ten years than four or eight.

But the chief fallacy involved in the proposed amendment lies in the assumption that the value of an invention is always to be measured by the ability of the inventor to pay a heavy fee: if he can pay $185, his invention is good; if he cannot, it is bad, and should be put out of the way. Under this rule there is scarcely an invention of exceptional merit, perhaps not one of the great inventions which have done so much to hasten our progress as a nation, that would not have been summarily extinguished. Their inventors have found them anything but profitable during the first few years, sometimes during the entire life of the patent. It would be sheer cruelty, and as impolitic as cruel, to add to the discouragements of the inventor the risk of losing all through inability to meet severe and needless demands.

Indeed it is altogether too common, in the discussion of this question, to overlook the fact that the majority of inventors are poor men, and that the public, which is ready enough to laud an inventor after he has compelled recognition of his merits, is only too ready to give him the cold shoulder while he is struggling against poverty and the inertia of professional routine and popular ignorance. The assurance that a patent once granted is property, that it will insure the protection of his rights when their value has been demonstrated, spurs the inventor on to efforts which very frequently make him a benefactor to his age and country. In multitudes of cases important improvements or radical innovations of great value are delayed because of the inventor's inability to command the relatively small fees already demanded at the Patent Office. To add one hundred and fifty dollars to them, as proposed, would put the hope of securing a patent out of their thoughts entirely, and in thousands of cases would result in putting an extinguisher upon their creative labors. The country cannot afford to have its best workers so seriously hampered, so needlessly discouraged.

This is not a theoretical objection. The practical effect of heavy patent fees may be seen in the history of every nation that has tried them. In England, far example, it is an admitted fact that poor men do not invent, or if they do the public reaps small benefit from their labors. Like the senior Bessemer they carry the secrets of their discoveries to the grave; and improvements of great industrial value are frequently lost in this way, when under a more just and liberal patent system they would remain on record part of the stock of common knowledge for the enrichment of after years.

THE TUNNEL UNDER THE BRITISH CHANNEL.

The reason why the Channel Tunnel Company recently ceased their operations in St. Margaret's Bay is stated to be that, when the reports as to the soundings between Sangatte and St. Margaret's Bay were handed in by the surveyors, it was found that to cut a tunnel between those points would entail an enormous amount of work in sinking. The site in question has, therefore, been finally abandoned. The scheme now before the company provides for the sinking of a new shaft at or close to Dover.

The site on the French side at Sangatte, near Boulogne, is still looked upon as the best that could be chosen for the commencement of the tunnel. The shaft sunk there is already 70 meters in depth, with a diameter of 2 meters, and the engineers consider that when they have got 10 meters further down the horizontal cutting may be commenced.

The engineers of both countries agree that the French opening of the tunnel is the most difficult part of the undertaking, as a clayey soil has to be dealt with instead of chalk, and the incursion of water causes much trouble.

PROTECTION TO BANKS.

A correspondent suggests that an insurance society could be organized, which, for a moderate premium, could insure bank premises against burglary. It would then be the duty of trained inspectors to examine into the security of the safes and locks, and to order the adoption of the latest and strongest safeguards; and should these be broken through, the reserve fund of the insurance company would make good the loss, which would thus be equally distributed over the community.

Possibly an organization of this sort might be useful. It would have to be very careful in its agents, however, lest it be converted into a source of danger through the collusion of inspectors and burglars. In this, as in other cases, prevention is better than cure; it would be better, as well as cheaper, for the banks to forestall the burglars with scientific safeguards. There is no fear of time-locks and electric alarms betraying combinations.

THE HOG CHOLERA COMMISSION.

Congress having appropriated at the previous session $10,000 to pay the expenses of investigating the nature and cause of the diseases prevalent among swine, the Commissioner of Agriculture appointed a number of competent gentlemen in the States of Indiana, Illinois, Iowa, Nebraska, Kansas, Missouri, North Carolina, Virginia, and the Western part of New York, who have been engaged in prosecuting their investigations, and have nearly all submitted extended reports, which have been carefully collated and the results embodied in a report that will shortly be presented to Congress. From these papers it appears that the identity of the disease in all portions of the country is pretty thoroughly established, that the term "hog cholera" appears to be a misnomer, and that in all cases of the disease the lungs appear to be affected. Among the gentlemen engaged in the investigation are Dr. H. J. Detmos, the veterinary writer for the Chicago *Tribune;* Professor Law, of the Cornell University; Dr. D. W. Voyles, of New Albany, Ind., and Dr. Salmon, of North Carolina, from whose knowledge it is supposed that the results of the investigation will prove of the highest importance in throwing light on a subject which has never been fully understood, and in checking a disease whose ravages yearly destroy a large portion of the revenue of our stock raisers and farmers.

Another Adverse Trade Mark Decision.

Some time ago a bill in equity was filed by Day & Frick, soap manufacturers, of Philadelphia, against P. Walls, another extensive soap manufacturer, in which an injunction was asked to restrain the employment of certain labels and wrappers used by Walls in his soaps. These labels, it was alleged, contained language similar to that registered as a trade mark at Washington by Day & Frick. The description secured by them in designating the soaps were the words "bleacher," "bleaching," together with a device of a pair of scales and other signs, and it was claimed that the use of this trade mark by Walls was an infringement.

In behalf of Walls, his counsel, Pierce Archer, subsequently filed a demurrer to the bill, claiming that the act of Congress was *ultra vires*—beyond the constitutional powers which authorize Congress "to promote the progress of science and the useful arts by securing for a limited time to authors and inventors the exclusive right to their respective writings and discoveries." A trade mark, Mr. Archer held, was neither an invention nor a writing, but simply an advertisement, and as such was not within the pale of the section.

Judge Cadwalader has sustained Mr. Archer's objections, on the ground that the court has no jurisdiction to entertain conflicts over trade marks. It is probable that this case will be taken to the Supreme Court of the United States.

Manes' Revolving Furnace.

The revolving furnace recently patented by Mr. James Manes, of 1844 Fulton Avenue, Brooklyn, N. Y. (formerly of New Haven, Conn.), has been applied to the extraction of quicksilver from cinnabar, to desulphurizing ores, drying fertilizers, and animal and vegetable matters, also for making gas. We are informed that it is economical and effective, and accomplishes its work without allowing injurious fumes to escape.

THE EAGLE ANVIL.

The Eagle Anvil Works, of Trenton, N. J., were established in 1843, and have been in successful operation ever since. The anvils made at these works have a gun metal body, and a face of Jessop's best tool steel, which is welded so perfectly to the body in the process of manufacture that it is impossible for the two to become separated. The face is planed perfectly straight, and hardened to such a degree that the hammer will make no impression on it, and it is stated that the face will remain true.

Every mechanic knows that the more solid any material used to hammer on is, and the less rebound to the hammer, the more effective the blow is on the work. Labor is lost just in proportion as the hammer bounds back. All wrought iron anvils throw the hammer back to a considerable extent; this is avoided in the Eagle anvil, and every pound of his helper's sledge hammer is effective, and the blacksmith himself can do more work and may use a lighter hand hammer. The complaint of deafness, so often occasioned by the ringing of the anvil, is avoided by using this anvil, which does not ring

These anvils took the prize medal at the Centennial Exhibition. One of the anvils shown was 5 feet long, 8 inches wide, and weighed 1,400 lbs., being the largest ever made in this country.

For further particulars address Messrs. Fisher & Norris, Trenton, N. J.

THE EAGLE ANVIL.

Plaster of Paris.

Plaster of Paris may be made to set very quick by mixing it in warm water to which a little sulphate of potash has been added. Plaster of Paris casts, soaked in melted paraffine, may be readily cut or turned in a lathe. They may be rendered very hard and tough by soaking them in warm glue size until thoroughly saturated, and allowing them to dry.

Plaster of Paris mixed with equal parts of powdered pumice stone makes a fine mould for casting fusible metals; the same mixture is useful for incasing articles to be soldered or brazed.

Casts of plaster of Paris may be made to imitate fine bronzes by giving them two or three coats of shellac varnish, and when dry applying a coat of mastic varnish, and dusting on fine bronze powder when the mastic varnish becomes sticky.

Rat holes may be effectually stopped with broken glass and plaster of Paris.

The best method of mixing plaster of Paris is to sprinkle it into the water, using rather more water than is required for the batter; when the plaster settles pour off the surplus water and stir carefully. Air bubbles are avoided in this way.

Effect of Tobacco Smoke on Photographs.

At a recent meeting of the Photographic Society of Berlin, Professor Duby gave a lecture, accompanied by specimens and experiments, on "Positives, their different Methods of Preparation." He presented a number of beautiful examples. Finally he undertook to show the practical working; but the paper, charged with bromide of silver, instead of yielding clear and beautiful prints as formerly, now gave only foggy, indistinct pictures, which at first could not be accounted for. Dr. Harnecker, however, suggested that the trouble was due to the tobacco smoke that during the lecture had filled the room. This conclusion was agreed to by all present, and the general opinion was that it would be quite impossible, under the circumstances, to obtain good prints.

Remarkable Salt Deposits.

Nature reports that recent borings made in different parts of North Germany have proved beyond denial that the assertion made by several eminent geologists, that a mighty deposit of salt stretches from the Lüneburger Heide to the coast of the Baltic, is perfectly correct. The deposit begins near Lüneburg, passes underneath the Elbe, and extends right across the Grand Duchy of Mecklenburg. Another branch goes in the direction of the Duchy of Holstein *via* Legeberg to Elmshorn and Heide. Borings made at Lübtheen, near Hagenow, by order of the Mecklenburg Government, have now reached a depth of 456 meters, and the thickness of the deposit of salt now reaches 130 meters; the basis, however, is not yet reached.

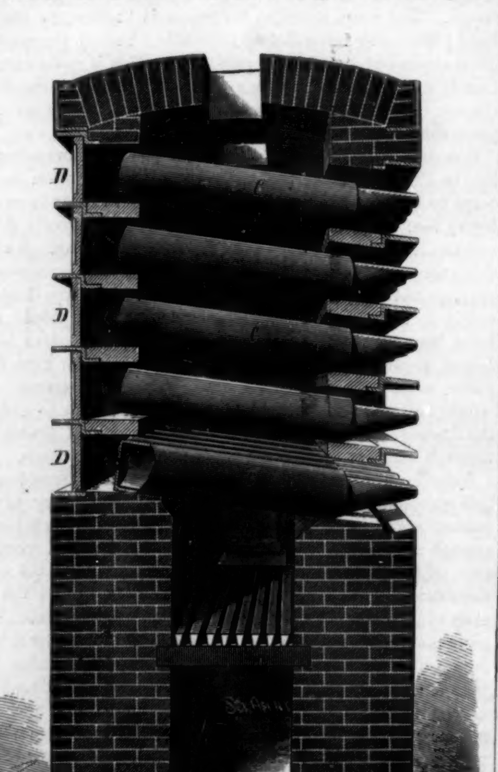
The Basis of Matter.

In the *Chemical News* for November 15, Mr. Norman Lockyer announced the discovery of the compound nature of the chemical elements. The claim had already been communicated to the Paris Academy of Sciences, through the venerable chemist, M. Dumas, who observed that the discovery was the result of three years' assiduous research, in which Mr. Norman Lockyer has, with the greatest care, compared the spectra of the chemical elements with the solar spectrum and other luminous celestial bodies. In the private letter to Mr. Dumas, accompanying his note to the academy, Mr. Lockyer announced that he would shortly send the photographs and other details necessary, which would carry conviction to the minds of the members of the Academy.

Speaking of the discovery, a London paper, evidently well informed with regard to Mr. Lockyer's work, remarks that the eventual dissociation of the so-called elements was confidently contemplated by Faraday nearly 30 years ago, and it is not too much to say that the expectations entertained by that eminent man gave a stimulus for work in the laboratory which has never been lost by those who were privileged to be learners or fellow laborers with him. Since Faraday's time, the whole question of the physical constitution of the universe, and especially the particular manner in which creative power may have gradually elaborated the present cosmical order of things, has been investigated with a zest, and, it may be added, with facilities for discovery, which have lent a greatly increased interest and importance to inquiries into the elementary and primal forms of matter. The apparently well grounded belief that the heavens afford to the view of the astronomer the process of world making in its various stages has done much of late years to encourage the particular branch of research which now seems to be yielding such extraordinary and valuable results. Mr. Lockyer believes that, in spite of the multiform aspects of the world in which we live, there is but one form of matter which is truly elementary. The primal element is presented to us in the shape of hydrogen. It is not a little remarkable that the nature of hydrogen should have been a question to which the leading French chemists have recently been devoting their energies. It is now well known, thanks to M. Pictet and his French colleagues, that hydrogen, in its gaseous form, can be, and has been, reduced to a liquid condition. Mr. Lockyer himself has arrived, by means of the spectroscope, at the conclusion that hydrogen can no longer be regarded as a simple element. Further, he believes he has proved that hydrogen is the one body of which the various metals and earths that have hitherto constituted the chemist's catalogue of elements are composed.

FURNACE FOR SPELTER AND WHITE OF ZINC.

The annexed illustration represents a furnace for a new process for the treatment of zinc ores, by which both spelter



DR. LUMAGHI'S ZINC FURNACE.

and white of zinc are obtained from the same charge, thus avoiding the loss of metal left in the refuse, and expediting the time necessary for a complete exhaustion of the charge so as to make it possible to charge several times during twenty-four hours.

The furnace wall, A, incloses the combustion chamber, B, and supports the retorts, C. The furnace is built after the plan of the Belgian furnace with openings in the rear as well as the front, each retort, C, having a hole in the butt end which is luted during the process of making spelter. The openings at the rear of the furnace are protected by doors, D, lined with fire clay, and are luted to confine the heat while making spelter.

When the most abundant flow has been obtained and the flow of spelter begins to slacken, the doors at the back of the furnace are opened, the luting at the butt end of the retort is removed, and by the introduction of a metallic funnel lined with wire gauze deep into the condensers, a light draught of heated air is sent through the charge sufficient to keep up the combustion of the coal left in the retorts, which being by this time thoroughly incandescent, will give out the cleanest white of zinc, while the spelter, being mostly from first drawings, will also be of better quality than if it had been overheated for a long time, as in the old process.

By this process all that the ores contain is obtained in the shape of spelter and white of zinc, and the labor of discharging and cleaning the retorts is greatly facilitated by the coal in the retorts being consumed in the making of white of zinc. Poor ores, such as could not be worked in the old way (although they often yield the purest spelter), can be worked profitably by this process, as they are exhausted in so much shorter time. Light carbonate can be charged profitably four times in twenty-four hours. It is stated that zinc ores, intimately mixed with lead or other metals, may be successfully treated in this furnace by working out the spelter from the upper end of the retorts, while the lead and other fixed metals will be gathered at the lower end ready to be tapped when the operation is over. The inventor says that the ordinary furnaces can be easily altered so as to work on the improved plan. We are informed that this furnace is in successful operation at the inventor's works.

Patented through the Scientific American Patent Agency October 23, 1877. For further particulars address Dr. Octavius Lumaghi, Collinsville, Ill.

New Agricultural Inventions.

Mr. Henry E. Walker, of Fountain, Minn., has invented an Improved Machine for Removing Cockle-Seed, Wild Buckwheat, and other impurities from seed-wheat after it has been passed through an ordinary fan-mill and cleaned as much as it can be cleaned by such mills.

An Improved Cotton Hoe has been patented by Mr. E. H. Rogers, of Boley Springs, Ala. This is an improvement in that class of hoes which are used for cultivating and thinning out young cotton-plants. It consists in attaching three independent blades to one handle or helve by means of three independent arms.

Mr. Reuben B. Eubank, Jr., of Miami, Mo., has patented an improved Hay Raker and Stacker, which will rake up the hay after the mower, carry it to a basket or receiver until a sufficient quantity is gathered for a shock or stack, and then permit the basket to be emptied to form a stack at the desired place.

An improved Potato Digger has been patented by Mr. Hiram Strait, of Troy, N. Y. This is an improvement in the class of potato diggers in which the soil is opened by a share, and the tubers are separated from the soil and thrown out upon the surface by vibrating fingers.

The New Vault.

The new vault in the United States Sub Treasury, in this city, lately described by us, which has been prepared for the storage of silver dollars, is forty-eight feet in length, thirty feet in width, and 12 feet in height. If every available inch should be packed solidly with 412½ grain dollars it would hold not far from forty million dollars. Every one knows that silver is bulky, but few persons are aware how bulky it is. A bag of 1,000 412½ grain dollars weighs 59 3-16 pounds avoirdupois. Accordingly one hundred thousand of these dollars weigh not far from three tons. If a merchant or banker having a payment of $30,000 to make is compelled by circumstances to pay with silver dollars, he would need a vehicle as strong and as large as an ordinary coal cart (made to carry a ton of coal) to transport them, and if this should be heaped up, no more than 32,000 silver dollars could be loaded on it.

A Novelty in Illuminated Dials.

Apropos of illuminated watch faces and clock dials, to which attention has recently been directed, M. Recordon, of Paris, communicates the fact to one of our French exchanges that two years ago he took out a patent for, and has since been manufacturing, illuminated dials on an entirely different principle from those produced by the use of chemicals. His device is this: A Geissler tube containing a gas which gives a brilliant light is placed on the dial; a battery about the size of a thimble is attached as an ornament to the watch chain, and a miniature induction coil is also hidden in the latter. When it becomes desirable to consult the watch in the dark, a spring is pressed, the current passes into the coil, then into the Geissler tube, and illuminates the dial. The portable battery used for this purpose is that of Trouvé, which, in a small compass, has considerable strength. Reduced to the size of a thimble, it is still sufficiently strong in its action to last a year. M. Recordon also applies the same principle to the illumination of clock faces.

ANIMAL MECHANICS.

A highly interesting and suggestive paper on some unsettled points in animal mechanics was read before the New York Academy of Sciences, at their regular meeting, November 4, by Prof. W. P. Trowbridge, of the Columbia College School of Mines.

The subject of animal mechanics is an important one; the very existence of animals depends on their power of locomotion, by which they are enabled to escape danger and to search for food. In recent times this subject has been studied by Marey, who instituted a number of ingenious experiments to determine the exact curve described by the wing of a bird while flying, and of a horse's hoof while in motion. Houghton studied the matter in a much more philosophical manner, and with the view to determine the laws of fatigue and rest. One of the most recent books on the subject, by Pettigrew, is so full of absurd and ridiculous positions, that its admission in the international series is a matter of astonishment. Huxley, in his physiology, briefly refers to the elementary machines as exemplified in the bodies of animals, and classes them as levers of the first, second, and third orders, while Marey assigns them all to the third order, and remarks that man has greatly improved on the model provided by his own body, as regards the transmission of power. A little consideration will soon teach us, however, that we are very far indeed from even approaching the perfection of our own structure in our best mechanical contrivances. Imagine a skeleton before us, all the bones of which may be provided with cords and pulleys, and then realize how far such a machine would be from uniting the infinite variety of motions executed by a lady while playing the piano; and yet all her motions are produced by the action of cords on rigid bones. Foucault compares the motions of a fish's tail with that of a propeller, but in reality there is no comparison between them. Man the fact that forces do not exist except in the action of one body upon another.

Only two geometrical theories are required to discuss the effect of forces on the animal mechanism. The first is that of the "moment of forces." The moment of a force is the product of that force, measured in pounds, etc., by the lever arm or perpendicular distance of its line of action from the fulcrum. Thus, in a common lever in equilibrium (Fig. 1), the power multiplied by its lever arm is equal to the weight multiplied by its lever arm, and the pressure on the fulcrum represents a third force, which maintains the equilibrium of the other two. The other theory involved is that of the parallelogram of forces. (See Fig. 2.) If one force, sufficient to move a body from A to B, acts simultaneously with another force tending to move the same body to D, the body will reach C by moving along the diagonal, A C, of the parallelogram constructed upon the lines representing the two forces.

Fig. 1.

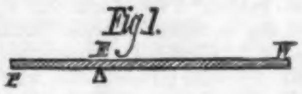
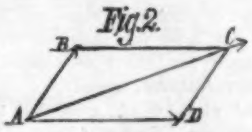


Fig. 2.



All elementary machines, or simplest devices, by which force is applied to overcome resistance, either in mechanisms or the animal frame, may be classed under four heads:

1. Lever.
2. Inclined plane.
3. Jointed links.
4. Hydrostatic press.

The elementary machines have been discussed for many years, and authors differ greatly in their classifications; but the above may be the simplest for present purposes. The principle of the lever has already been stated, and it includes the wheel and axle and the movable pulley. The inclined plane and the jointed links (also known as the toggle joint) depend on the parallelogram of forces. A force applied at the joint of two rigid bars, one of which is fixed and the other free to move outward in such a way as to increase the angle between them, will be greatly multiplied at the free end. This machine is employed in hand printing presses, in Blake's stone crusher, in cutting iron, etc. The hydrostatic press depends on the distribution of pressure by liquids. (The Professor here exhibited a combination of all these machines in a single mechanism for stamping a die.) The mechanism of every machine, from a watch to a steam engine, and the frame of every animal, is made up of a combination of some of these elementary machines.

In the following remarks on locomotion, microscopic animals, which propel themselves by the vibration of cilia, or by simple contraction like the earthworm, are not considered.

A diagram was then shown, representing the skeleton of a tiger, to explain its great power of striking with its forefeet, and of springing with its hind feet. A powerful muscle was seen attached to the backbone and to the forearm, and another to the shoulder blade and the projection of the elbow, thus forming a combination of levers producing the greatest economy of force. In the hind leg the muscles are similarly attached to a jointed link, having a great range of motion by reason of the ability of the animal to draw its hind legs close up to its body. Whenever the body of an animal is raised from the ground, it is done by means of jointed links, the ground furnishing the resistance.

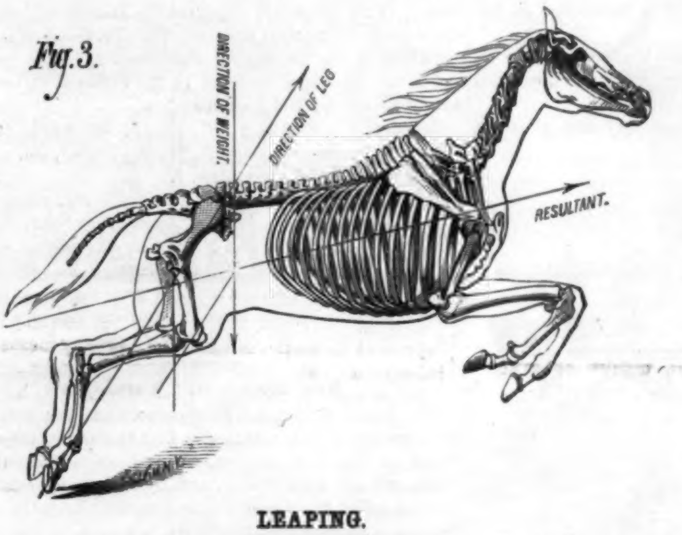
This point was illustrated by a diagram of a horse in the act of leaping (Fig. 3). Here we have a thousand pounds leaping easily and readily into the air, and an examination of the hind leg of a horse will reveal the fact that it consists of a combination of jointed links. By the parallelogram of forces we then combine the force of propulsion with the weight of the animal, and we find the direction of the spring. When the momentary force of propulsion has ceased, gravity acts alone, and the horse reaches the ground by a curve. To resist the shock, the muscles of the foreleg are well developed.

It is generally supposed that horses draw loads by their shoulders, but this is an error. They do it chiefly by their hind legs, the trunk acting only as a beam, to which the traces are attached (Fig. 4). The resultant is here seen to pass through the trunk, and this explains why a horse pulling a load may at the same time carry a load on its back, the effect being to increase its own weight.

The force exerted in leaping was excellently illustrated by means of a jointed hat rack, where it was evident that very little force applied at one end propelled the other through a considerable distance.

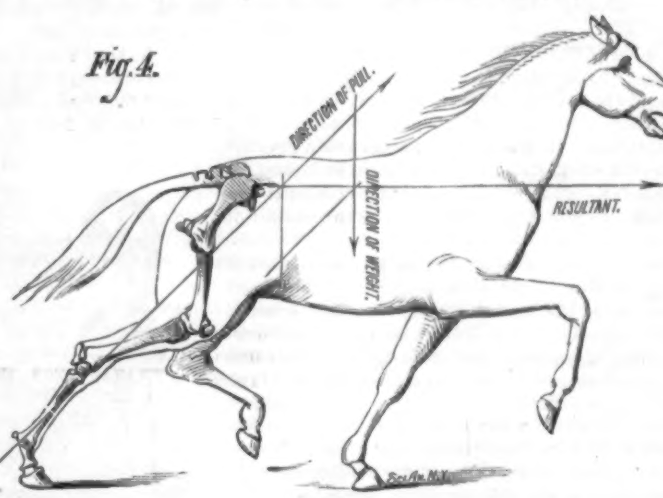
The octopus uses the hydrostatic press alone to propel itself in the water. At first sight it would seem as though its long arms (30 to 40 feet), extending in all directions, would be extremely unfavorable to motion, but a little closer examination will show that it arranges them in the position of least resistance and swims backwards in the following manner: A powerful hollow muscle passing all around the animal's body is filled with water and confined by a valve, it is then forced through a narrow exit pipe, and the octopus moves by the force of the recoil.

Fig. 3.



LEAPING.

Fig. 4.



PULLING.

Man cannot approach the perfection of this animated instrument of propulsion.

To begin at the very foundation of our subject, in order to obtain a clear and connected view, the following forces may be considered as the only ones involved in animal locomotion:

External forces: 1. Gravitation; 2, inertia; 3, friction.
Molecular forces.
Muscular contraction.

Of the nature of the force of gravitation we know nothing; but we all know its effects and the law according to which it acts, namely, "Every body attracts every other body directly as its mass and inversely as the square of the distance." With inertia we are all familiar. It is the resistance a body opposes to a force tending to move it. With friction we are acquainted chiefly as an obstruction to motion; but we are also continually availing ourselves of it to produce useful work. The difficulty of walking on ice will give us a faint idea of the predicament we should be in without the existence of this force. But for friction the mountains would run down and fill the plains.

Of the molecular forces, the only one we need consider is that which resists rupture from strains to which the animal frame is constantly subjected.

Muscular contraction is a vital force whose cause is not known; all we can say of it in this connection is that it pulls the tendons by which the muscles are attached to the animal frame.

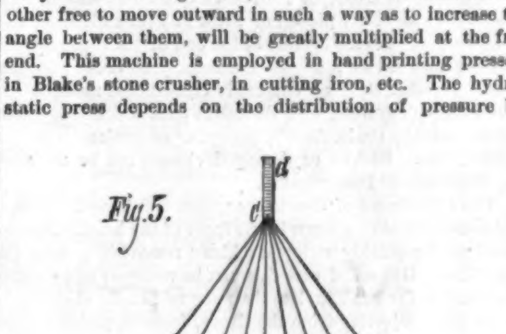
All these forces are susceptible of being measured in pounds, and of being represented by right lines, the length of each line being in proportion to the amount of the corresponding force.

The dynamical laws involved in the motions produced in the animal mechanism by these forces are represented by the following axioms of Newton:

1. Inertness.
2. Motion is proportional to the impressed forces.
3. Action and reaction are equal.

By inertness Newton designates the force of continuance residing in matter by virtue of which it retains any force imparted to it. That the motion produced is proportional to the impressed force is an axiom to which we readily assent. The axiom that action and reaction are equal is involved in

Fig. 5.



The swimming of a fish is usually explained in the cyclopedias by means of a time-honored diagram representing a parallelogram of forces constructed on the resistance of the water and the motion of the fish's tail. It is very easy to understand how the tail moves the fish forward when it turns one way; but why the fish is not drawn back again by the contrary motion of the tail is not so plain. In fact, Sir John Lubbock at one time gave up the problem and confessed he did not see how a fish managed to swim.

It must be remembered that the tail of a fish is flexible, and that its flexure is in contrary directions during the two halves of its stroke. The diagrams (Fig. 5) will then make its action plain. Suppose the bent bar, *a b c*, to be articulated at *c* to a fixed piece, *c d*, and to move through a resisting medium from left to right. It is evident that it will exert a forward pressure at the point of articulation. Now, when it arrives at the extreme right, let the flexure of the bent bar be reversed, as shown in the dotted lines; we will have the same conditions as before, and a forward pressure will again be exerted upon the point of articulation during the whole of the return stroke.

In the case of a fish's tail we have no bar, but a yielding material which will describe curves. An idea of this motion is easily acquired by waving a feather rapidly through the air. If the mainsail of a common schooner could by any mechanism be made to oscillate rapidly to and fro like the tail of a fish, it would propel the schooner. In the case of a snake wriggling through the water, the whole body may be viewed as a series of planes, each of which exerts the same forward pressure as does the tail of a fish. Some species of sharks propel themselves by a kind of sculling motion of the tail, which is so powerful that they have been known to jump clear over the decks of schooners.

Professor Trowbridge exhibited a small boat which he had constructed, and which was propelled in a trough by means of the fin of a fish oscillated by clockwork.

A great advantage of animal over artificial mechanism is that the animal frame adapts itself to the kind of work required of it; the muscles that come into play grow more and more capable of performing it. This point is well observed by comparing those whose labors affect one set of muscles chiefly with those accustomed to a great variety of motion—the hod carrier and the gymnast, for example.

The force of inertia is constantly experienced in every motion we make. We cannot even rise from a chair without leaning forward first, *i. e.*, placing our bodies in a position favorable for overcoming their inertia. In leaping, flying, etc., the initial effort is always the greatest, much less force being afterward required to keep up the motion. All these efforts result in fatigue proportional to their intensity. Thus, in walking on a level plane, the body is raised on an average 1-2 inch from the ground at every step. In walking up stairs the force expended is much greater. By the time a lady has ascended three flights of stairs, she experiences more fatigue than after walking around two blocks in New York. The study of animal mechanics may be productive of great advantage to us, by leading us to a better understanding of the laws of fatigue and rest.

Professor Trowbridge's paper was followed by a discussion in which Messrs. Newberry, Warner, and Martin took part. Attention was drawn to the wonderful instinct by which birds so adjust the resisting surfaces of their bodies as to be able to sail across and even against powerful currents of air with apparent ease, and to another cause of superiority of animal over artificial mechanism, namely, the mysterious nerve communication by means of which the different organs transmit their sensations to the brain of the animal, and in return receive instantaneous commands, enabling them to adapt themselves to every emergency. C. F. K.

Correspondence.

Alum in Baking Powders.

To the Editor of the Scientific American:

SIR: In your issue of the 7th inst. I noticed an article on the above subject by Henry Pemberton, Jr., as also some editorial remarks by yourself. With respect to Mr. Pemberton's remarks, I would state that it is evident he formed his opinion on entirely a theoretical basis. His opinion is one which would very probably be expressed by any number of persons who rely on theories instead of on facts. Mr. Pemberton states that when an alum baking powder is used in baking, the alumina of the alum is precipitated and becomes insoluble by heating. A very distinguished scientific man writes to me, and says: "This is a matter of experiment, and facts thus obtained are undoubtedly worth far more than conclusions derived from theoretical considerations." This last paragraph has embodied in it my views on this subject, and it strikes me it would have been proper for Mr. Pemberton to have made a few experiments with bread or biscuits made with an alum powder, to see if the alumina was really in an insoluble or in a soluble condition, before expressing so decided an opinion. I am perfectly well aware that when an alum baking powder is used in baking, the alum is transformed into another alumina salt, provided the constituents of the powder are combined in exact chemical equivalents. If, however, the constituents are not in exact equivalent proportion (which is more probable than otherwise, as chemical weights are seldom, if ever, adopted by manufacturers), there will be a certain per cent of alum left unaltered. There would, therefore, be present in the baked product in either case an alumina salt; and in the last, or more probable case, in addition to the alumina salt, some unaltered alum. So that, supposing a portion of the alum was transformed into an insoluble alumina salt (which has not been proved as yet in the baked product), it is evident persons eating the baked product would run the risk of taking into their stomachs the unaltered alum. It is true the per cent of this would probably be small, but by its continued use would certainly bring about serious disorders in the system. As regards the alumina salt, let us stop a minute. Wagner states: "The active principle of alum is evidently the sulphate of alumina, not the sulphate of potassa and ammonia." That alumina is the poisonous element of alum, I think the following provings clearly demonstrate, which I take from my Encyclopædia of Materia Medica: "It destroys the appetite, produces sour eructations, heartburn, pain in the abdominal ring, the rectum is rendered inactive, constipation or loose bloody discharges are produced." From these provings it will be seen that the effects of alumina on the system are substantially the same as alum. That is to say, that alumina bears the same relation to alum (being its active principle) as morphine does to opium or nicotine does to tobacco. Supposing, again, that the alumina salt formed in baking was in an insoluble condition (which I have already stated has not been demonstrated), and not considering the amount of alum left unaltered, I doubt if the public would be willing to run the risk of eating the baked product, for fear that the heat of the oven was not in the proper condition to render it all insoluble. Supposing, on high scientific authority, I should state that a salt of antimony (take for example tartar emetic) if added to a cup of tea would be completely neutralized by the tannin or rendered "insoluble" for instance. How many persons would I find willing to drink the tea? Not many, I am quite positive; and this is the view I think the public will take about alum baking powders. When they can obtain a number of powders on the market composed of wholesome constituents, I think they will not care to run the risk with alum powders. As to the alumina salt being in an insoluble condition, I shall, in a future article, have something more to say, to satisfy the scientific men; but I think the public will have received, after carefully reading the above, sufficient satisfaction or explanation to convince them that alum baking powders are most dangerous to use.

In answer to "Pro Bono Publico," I would state that my intention was in the beginning to expose injurious baking powders: not to advertise baking powders. It was necessary for me to select a good baking powder for comparison, which might have been any of the other powders other than the one selected, if I found it composed of wholesome elements. For me to publish the whole list and have my name on every baking powder can in the country, as I have been asked to do by a large number of manufacturers already, is more than I am willing to do, and also, I think, more than the public would think of asking of me. Respectfully,

HENRY A. MOTT, JR., Ph.D., E. M.

New York, November 28, 1878.

P. S.—Mr. Dooley insinuated to you that my analysis of his powder was not correct. Now, in justice to me and the public who wish only the truth, I suggest that Dooley publish in your paper a correct analysis of its composition. I found over 26 per cent of burnt alum in one sample.

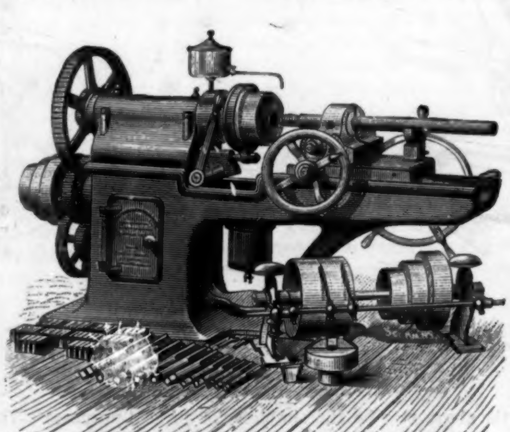
H. A. MOTT, Jr.

IMPROVED BOLT CUTTER.

The annexed engraving represents a machine for cutting screw threads on bolts, and is one of superior design. It is named the No. 5 National Bolt Cutter, and is adapted for cutting threads on bolts from one inch to two and a half inches in diameter. Among other good features claimed by the manufacturers the following may be mentioned as the most prominent ones.

The die head is constructed to receive blocks or cases, with inserted chasers, forming the dies, thus doing away with the labor of fitting each die or chaser to the head.

The chasers, four in number, are simply flat pieces of steel, averaging about an inch and a quarter in length, and which may be either planed or fitted in with a file from the rough stock. A small screw in the end of the case sets the chasers forward as it becomes necessary to dress over the dies. Another style of chasers is constructed upon the interchangeable system, with threads at each end, and are held in the cases by studs, thereby becoming as serviceable as two sets of dies. Broken or damaged chasers can be replaced by duplicates at little expense.



THE NATIONAL BOLT CUTTER.

The adjustment of dies to the proper size is accomplished by merely turning a screw in the front of the head. The die head can be quickly stripped without removing it from the machine. One set of case dies can be removed and another inserted in the head in less than one minute by changing a stop pin, projecting from the sleeve, from its position when the machine is working, to a point opposite a hole in the flange at the rear of the head, then, by means of the lever, pushing the sleeve back to the flange, uncovering the cases, and permitting their removal and replacement by hand. The machine can be quickly converted into a nut tapper by removing the case dies and putting in their place a steel block to which is secured a universal chuck for holding taps that is furnished with each machine. All the working parts of the die head are protected from chips or dirt. The locking device is positive and requires but one movement of the lever for unlocking and opening the dies or closing and locking.

The die blocks are held rigidly by the inclosing sleeve when locked, and consequently cut bolts of more uniform diameter than is the case when the chasers or cutters can spring away from the bolt when cutting.

Machines of this description are made of various sizes, and for special purposes with the necessary modifications in gearing and proportions. They are supplied with all necessary adjuncts and facilities for lubricating the parts, and are constructed with the care and extreme accuracy for which this company are so well known.

Further information may be obtained from the makers, the Pratt & Whitney Company, of Hartford, Conn.

ASTRONOMICAL NOTES.

BY BERLIN H. WRIGHT.

PENN YAN, N. Y., Saturday, December 28, 1878.

The following calculations are adapted to the latitude of New York city, and are expressed in true or clock time, being for the date given in the caption when not otherwise stated:

PLANETS.

	H.M.		H.M.
Mars rises	4 51 mo.	Uranus rises	9 16 eve.
Jupiter sets	7 14 eve.	Neptune in meridian	7 52 eve.
Saturn sets	11 12 eve.		

FIRST MAGNITUDE STARS, ETC.

	H.M.		H.M.
Alpheratz in meridian	5 33 eve.	Procyon rises	6 45 eve.
Mira (var.) in meridian	7 44 eve.	Regulus rises	8 48 eve.
Algol (var.) in meridian	8 31 eve.	Spica rises	1 29 mo.
7 stars (Pleiades) in merid.	9 11 eve.	Arcturus rises	0 32 mo.
Aldebaran in meridian	9 59 eve.	Antares rises	5 35 mo.
Capella in meridian	10 38 eve.	Vega sets	8 57 eve.
Rigel in meridian	10 39 eve.	Altair sets	7 45 eve.
Betelgeuse in meridian	11 19 eve.	Deneb sets	0 07 mo
Sirius rises	7 10 eve.	Fomalhaut sets	8 21 eve.

MOON'S PLACE IN THE CONSTELLATIONS AT 7 P.M.

Saturday, *Aquarius*	9°	Wednesday, *Pisces*	27°
Sunday, *Aquarius*	21°	Thursday, *Aries*	9°
Monday, *Pisces*	3°	Friday, *Aries*	21°
Tuesday, *Pisces*	15°		

REMARKS.

Venus is still invisible, setting only 18 minutes after the sun. Saturn will be about 7° south of the moon December 30. The earth will be nearest the sun January 2, 1879.

Prof. James C. Watson, late of Ann Arbor, Mich., and Prof. Lewis Swift, of Rochester, N. Y., are, we believe, of the opinion that the planets discovered by them during the July eclipse are identical. Thus two planets were discovered within 2m. 52 seconds after the commencement of the search for them. Exclusive of comets, there are now 224 members of the solar system known.

There are now 190 asteroids known, unless others have been discovered since October 1. In 1875 there were 17 discovered, the greatest number in one year. Prof. C. H. F. Peters, of the Litchfield Observatory, Hamilton College, has discovered the greatest number—31. Professor Watson follows him in the list, having discovered 23. The following shows the number discovered in the different months, September being the lucky month:

January, 11; February, 15; March, 15; April, 24; May, 14; June, 8; July, 8; August, 21; September, 33; October, 16; November, 22; December, 3.

January 9 Neptune will be 10° 43m. 47 sec. south and 5° 10m. 48 sec. east of *a Arietis*. January 29 Neptune will be 10° 41m. 50 sec. south and 5° 12m. 45 sec. east of *a Arietis*.

A line from *Lambda* (91) *Ceti* through *Mu* (87) *Ceti* produced five degrees northwest, will pass very close to Neptune. *Lambda* and *Mu* form the northern side of a pentagonal figure (sides 3°–5°) in the Whale's head.

New Mechanical Inventions.

Mr. James Griffin, of Mendocino, Cal., has patented an improved Saw Guide, that may be adjusted by the operator when the saw is in the cut, which is of special advantage when sawing long timber, and by which the wear of the parts is taken up in easy manner, so as to keep the guide always in good working condition.

Mr. Charles Galigher, of Cairo, Ill., has patented an improved Millstone Curb and Chop Conveyer. In this contrivance the meal cannot choke up or become clogged, but falls freely from the vicinity of the stones as soon as it comes out from between them. Access of air is thus permitted to the stones, and the flour is not injured by detention between the grinding surfaces or by friction against the stone and curb.

Mr. Harrison W. Holley, of Hale's Ford, Va., has invented an improved Machine for Rolling and Cutting Tobacco, which consists, essentially, of three sets of pressure rolls, arranged successively close together, an endless feed belt passing through the first set of rolls, longitudinal knives on the second set, and transverse knives on the third set, all of said rolls being geared together, so as to press and cut the tobacco as it is carried through the machine by the endless belt.

Southern Factories.

According to a carefully prepared statement of Gen. L. P. Walker, of Alabama, that State has 2,118 factories, working 8,248 hands, with a capital invested of $5,714,032, paying annually in wages $2,227,968, and yielding annually in products $13,040,644. Florida has 630 factories, working 2,749 hands, with a capital invested of $1,679,930, paying annually in wages $989,592, and yielding annually in products $4,685,403. Georgia has 3,846 factories, working 17,871 hands, with a capital invested of $13,930,125, paying in wages $4,844,508, yielding annually in products $31,196,115. Louisiana has 2,557 factories, working 30,071 hands, with a capital invested of $18,313,974, paying in wages $4,593,470, yielding annually in products $24,161,905. Mississippi has 1,731 factories, working 5,941 hands, with a capital invested of $4,501,714, paying in wages $1,579,498, yielding annually in products $8,154,758. South Carolina has 1,584 factories, working 8,141 hands, with a capital invested of $5,400,418, paying in wages $1,543,715, yielding annually in products $9,858,981. Texas has 2,319 factories, working 7,927 hands, with a capital invested of $5,284,110, paying in wages $1,787,835, yielding annually in products $11,517,302. Aggregate number of factories, 14,884; aggregate number of hands employed, 80,948; aggregate capital invested, $54,824,303; aggregate wages paid annually, $17,514,516; aggregate annual value of products, $102,615,108.

The Industrial Development of Cleveland, Ohio.

The rapid industrial development of the West finds no more notable illustration than the recent rapid growth of Cleveland, Ohio, as a manufacturing city. Its first city directory, issued just 40 years ago, enumerated among the manufactories on the east side, 4 iron foundries and steam engine manufactories, 3 soap and candle manufactories, 2 breweries, 1 sash factory, 2 ropewalks, 1 stoneware pottery, 2 carriage manufactories, and 2 French burr millstone manufactories. These were all very small in comparison with works of the same nature at the present time. On the west side of the river, then known as Ohio City, there was the Cuyahoga Steam Furnace, a steam boiler factory, a saleratus factory, and a glue factory.

The directory of the current year shows among the ironworking establishments, 16 first-class foundries, any one of which does more business in a year than all the iron works of Cleveland combined in 1837, 23 machine shops, 8 steam engine manufactories, 7 boiler making establishments, 4 agricultural implement manufactories, 3 axle manufactories, 2 boiler plate works, 6 bolt manufactories, 2 chain works, 2 cast steel works, 9 iron fence and railing works, 2 spring factories, 2 iron pipe factories, 3 car wheel factories, 2 car journal manufactories, 1 architectural iron works, 16 iron works of general character, 1 steel screw factory, 5 bridge building works, 1 car building works. There are also 4 brass foundries, 15 planing mills, 3 white lead factories, 3 woodenware works, 1 woolen mill, 4 chemical works, 6 flouring mills, a number of oil refineries of large capacity, including the immense Standard Oil Company's establishment, and manufactories of various other descriptions, with innumerable smaller workshops.

Handsome as Cleveland is, and justly as it bears the title of the Forest City, remarks the *Graphic*, which devotes the major part of an edition to the pictorial illustration of the city, it is, nevertheless, one of the great manufacturing points of the country. It has earned for itself the title of the Pittsburg of Ohio by the number and importance of its iron works. The odors of its great oil refineries are borne upon the breeze in all directions. Dense clouds of smoke are carried from the numerous foundries and factories far out upon the lake, so that the voyager from Buffalo is apt to see the smoky sign of Cleveland's whereabouts some time before the city itself is visible. Along all the five railroad lines entering Cleveland, but especially along the two principal coal roads from Pittsburg and the Mahoning Valley, are stretched manufactories of various kinds, and the Cuyahoga Valley is a busy hive of industry, while factories, large and small, are scattered through other parts of the city.

The development of the iron mines of Lake Superior, largely by Cleveland enterprise, and the easy access to the vast coal fields of Northeastern Ohio by the Ohio Canal and branches, and the Cleveland and Pittsburg and Mahoning railroads, encouraged the development of the iron making industry, which, together with manufacturing generally, received a sudden and extraordinary stimulus from the demands growing out of the war. Cleveland enterprise, also, was largely instrumental in the development of the petroleum fields of Pennsylvania, the consequence being the transfer of the greatest share of the refining industry to Cleveland, which has remained the headquarters of the refining trade. The opening of a railroad to the Tuscarawas Valley, and the connection of the railroad from Columbus with the Hocking Valley Railroad, placed Cleveland in communication with two new coal fields of inexhaustible extent, and the completion of the Valley Railroad next year will open an independent route to still another coal field, and furnish increased advantages for manufacturing.

While Cleveland is thus favorably situated for obtaining the raw materials, it is no less so for the distribution of the manufactured articles. Its railways radiate east, west, and south, like the ribs of a fan, with innumerable branches from the main lines, reaching every part of the country. To all principal points there are two or more competing lines. In addition, the lake affords unlimited facilities for shipment to Canada on the north, and to most points west and east. Under these favoring circumstances it is no wonder that Cleveland has become, within a few years, one of the most important manufacturing cities west of the Alleghanies.

Concentrate your Effort.

When Agassiz was asked to give his opinion on a question in chemistry, he persistently declined. "I am no chemist," was his only reply. This resolute concentration of his power in a few well defined channels was one of the secrets of his eminence. In this age, when knowledge goes on adding province after province to her vast empire, one can hope to explore but a little space. There are no longer any universal conquerors. Goethe and Humboldt have left no successors, and if they themselves were to return, they could not possibly take the positions they once held. Half the intellectual failures come from a lack of definite aim and an unflinching devotion to some special pursuit. When so many interesting fields of inquiry are open, it requires a Roman fortitude of mind to purposely give up all save one or two. But this is precisely what you must do if you mean to make your power tell in the world. To concentrate is to master something eventually, while to diffuse your time and energy is to acquire a great mass of imperfect knowledge, and to hold superficially a multitude of disconnected facts. There isn't a part of the human body, or a branch of any science, upon which one could not spend a lifetime of work, and yet leave much untouched. The Greek scholar who died lamenting that he had not confined his work to the definite article, instead of taking up in addition the indefinite, and so leaving both incomplete, is an example of what is demanded of one who means to master any one thing. Herbert Spencer is doing an immense work in the way of collecting facts that have a bearing upon each other in the various departments of science; but familiar as he is with all these subjects, he cannot do the work himself. Human life would not be long enough. Other brains and hands must serve him. And even when a scholar sets himself to do one thing, and nothing else, he finds himself unable to get everything at first hand. He is forced to take something from other workers in the same field. This is the experience of all life as well. You can do well only a few things, and the fewer they are the better you will do them. The Admirable Crichton type of man is very interesting to read about, but in actual life he is likely to raise great hopes, be very entertaining, and die without doing anything. The man who concentrates must often admit his ignorance, and he need not be ashamed to do so, for he knows that on his own ground he can accept the challenge of every comer.—*Christian at Work.*

A NEW BOTTLE STOPPER.

The accompanying engraving illustrates a device by which any quantity of liquid, even single drops, can be drawn from a bottle without incurring any loss by spilling. The device consists of a stopper and a faucet provided with a spout on one side. The whole apparatus is made of Britan-

POCHTLER'S BOTTLE STOPPER.

nia metal, and is covered with cork on the part inserted into the bottle. By opening the faucet more or less the flow of the liquid may be regulated.

This stopper is the invention of Mr. Carl Pochtler, of Vienna. Several stoppers similar to this have been patented in this country.

Our National Surveys.

The United States coast survey steamer, Blake, left Washington, November 28, for the West Indies. She will be gone six or eight months on a scientific cruise. Professor Agassiz, of Cambridge, joined the Blake, and will remain aboard her throughout the cruise. The work of the Blake will consist principally of deep sea soundings and dredging. The following is a list of her officers: Commander J. R. Bartlett, commanding; Lieutenant W. O. Sharrer; Lieutenant J. P. Wallace; Master, H. L. Jacobs, and Engineers, George H. Peters and E. L. Reynolds.

Professor F. V. Hayden and Major J. W. Powell have reported to the Secretary of the Interior the general results of their topographical and geological services the past season. The former says the results have been on the whole very satisfactory. About 12,000 square miles of very difficult country were surveyed, much of it in minute detail. The Yellowstone Park and the Wind River range of mountains formed a part of the region covered by Professor Hayden's survey.

The work under Major Powell has been prosecuted south and east of the grand cañon of the Colorado river, and little irrigable, but extensive grazing lands have been discovered. He reports having collected much ethnological material, and states he has nearly completed a map showing the distribution of the various Indian tribes within our present boundaries at the dates they were first known to Europeans.

The annual report of Lieutenant George W. Wheeler on the surveys west of the 100th meridian shows that nine districts and three astronomical parties were sent into the field this year. Their field labor will continue until some time in December. The survey this season embraces areas in California, Colorado, Nevada, Oregon, Texas, New Mexico, Utah, and Washington, connecting intimately with those of former years. A geological survey of portions of Colorado and New Mexico, by Professor J. J. Stevenson, was also carried toward completion, supplementing work of a former season by the same gentleman. During the winter and spring a topographical and hydrographical survey of the Great Salt Lake basin was carried forward. The detailed surveys of the interesting Lake Tahoe region and the Washoe mining district receive special notice. During the year ten topographical atlas sheets have been completed and published, several of which show land classification, and to all of which that important feature will ultimately be added. The second volume of the quarto reports of the survey, entitled "Astronomy and Barometric Hypsometry," and "Catalogue of the Mean Declination of 2,018 Stars," has also been published during the year, and other important works are in progress, of which Volume 6, "Botany," of the quarto reports, is in press. The area which will be surveyed by the parties in the field during this season is, approximately, 40,000 square miles in extent.

Last spring, in the original draught of the Sundry Civil Bill, containing the appropriations for these surveys, appeared a paragraph directing the American Academy of Science to prepare a plan before the next session of Congress under which the Interior Department Surveys should be consolidated, with a view to greater efficiency and economy. It is charged that this emanated from those interested in the War Department survey. At all events, as drawn it did not touch the Wheeler survey. The Hayden and Powell survey people were on the alert, however, and had the clause so amended as to include the entire lot of Government surveys. The amendment was passed, and the Academy of Science met November 5, to complete its report. Since then General Humphreys, chief of the engineers, has resigned his seat in the Academy, it is said because the report reflects so severely on the surveys made by his corps. However this may be, it is known that it recommends a sweeping change by proposing to consolidate the Wheeler, Hayden, and Powell surveys with the Coast Survey (now connected with the Treasury Department), transfer it to the Interior Department, giving it the new title of Coast and Interior Survey, equip it with a geological bureau for closet work, placing the topographic and geodetic work in the hands of civil engineers appointed for life, and turning over to this survey all appropriations made for geographical purposes, as well as those for the survey of public lands preparatory to sales. It is also recommended that the duties of the Surveyor General and of the General Land Officer be limited to the sale of the public lands.

Windmills.

Windmills are so constructed that the sails move in a nearly vertical direction. Motion is by this means communicated to the wind shaft, the brake wheel, and the center wheel that conveys the motion to the spur wheel driving the burrs. It is of importance that the sails be made in such a manner that the wind may have the greatest possible effect on them; for the wind does not act perpendicularly on the sails of a windmill, but at a certain angle, as the sail varies in its degree of inclination at different distances from the center of motion. As early as 1759, Smeaton made experiments upon the inclination of the sails in windmills. The inclination of the sail to the plane of revolution he found should vary in the following ratio, where the radius is supposed to be divided into six equal parts, and the angle of the sail given at each point:

	Angle with the axis.	Angle with the plane of motion.	
0		—	center.
1	72°	18°	
2	71	19	
3	72	18	middle.
4	74	16	
5	77½	12½	
6	83	7	extremity.

This inclination of the sail to the plane of revolution is known as its weather.

The velocity of the windmill sails, whether loaded or unloaded, so as to produce a maximum, is nearly the velocity of the wind, their shape and motion being the same. A windmill with 4 sails, the circle described by them being 72 feet in diameter, can raise 1,000 lbs. 230 feet in a minute. It is generally calculated that the millstones in a windmill should make five revolutions to every one made by the sail. The sails do not begin to turn until the velocity of the wind is about 12 feet per second. When the wind has a velocity of 19 feet per second, the sails will make from 10 to 12 revolutions per minute, and the burrs will grind from 880 to 990 lbs. per hour. When the wind reaches a velocity of 30 feet per second, a mill will carry all sail and make 22 revolutions per second, grinding 1,964 lbs. of flour in an hour. Following is a table of the velocity of wind:

Character.	Feet per second.	Pressure per square foot in pounds.
Scarcely sensible	1·5	1·005
Gentle wind	3	·123
Moderate breeze	6	·133
Brisk breeze	18	1·21
Good breeze	23	2·85
Brisk gale	30	4·44
High wind	45	9·96
Very high wind	60	17.71
Storm	70–19	30·49
Hurricane	100 or more.	

The tips of the sails in a windmill often move at the rate of 30 miles an hour, or 44 feet per second.

It is of great importance in windmills that the wood and iron work be of the best possible description. The brake wheel should be strongly constructed and covered with hard wood, and of ample length. The backs for straightening and carrying the sails should be made of the best timber, free from imperfections; and, consequently, pine or oak is generally employed for this purpose. The sails are attached to these backs by means of strong iron screw bolts. If the sails are 38 feet each in length, the backs should be made 40 feet in length, or two thirds the length of the sails. The

back is made as thick and wide at the middle as will fit the mortise in the wind shaft. The proper bearing must be given the back on the neck and journal. The proper inclination varies in different circumstances; the general rule is to give them from one to two inches to the foot of fall.—*American Miller.*

New Car Heating Apparatus.

A new car heating system has been adopted by the Metropolitan Elevated Railroad, of this city, and the apparatus has been applied to all of the cars on the road. Each car is provided with two radiators, composed of sections of three inch cast iron pipe, connected end to end by short pieces of one inch wrought iron pipe. These radiators are arranged along the sides of the car, one on each side, under the seats, and the steam pipes of the several cars in a train are connected by flexible pipes. Steam is taken directly from the locomotive boiler and reduced to about 5 lbs. pressure. It is conducted through all of the radiators in the train upon one side, and is returned to the locomotive by the radiators and connections on the other side. The water resulting from the condensation of steam is discharged into the water tank of the locomotive.

A steam siphon, which is connected with the discharge pipe, is used to remove water from the pipes, and to accelerate the circulation when required.

This system promises to be very successful. It is controlled by the American Car Heating Company, of Albion. N. Y.

Iron Working Improvements.

An English inventor proposes to prepare from iron a hydrated peroxide by forming heaps or beds of the metal, and keeping it moist with water or a saline solution, and in some cases he hastens the oxidation by the use of a galvanic battery. He takes the hydrated peroxide thus obtained and reduces it to a fine powder. He places at the bottom of a crucible a quantity of the oxide, and over it places cast iron; the crucible is then heated in a furnace until the iron is melted, and as soon as the oxide has acted sufficiently the metal is cast into ingots. These ingots are employed in the manufacture of steel by remelting them with steel or iron scrap, according to the quality of resultant required.

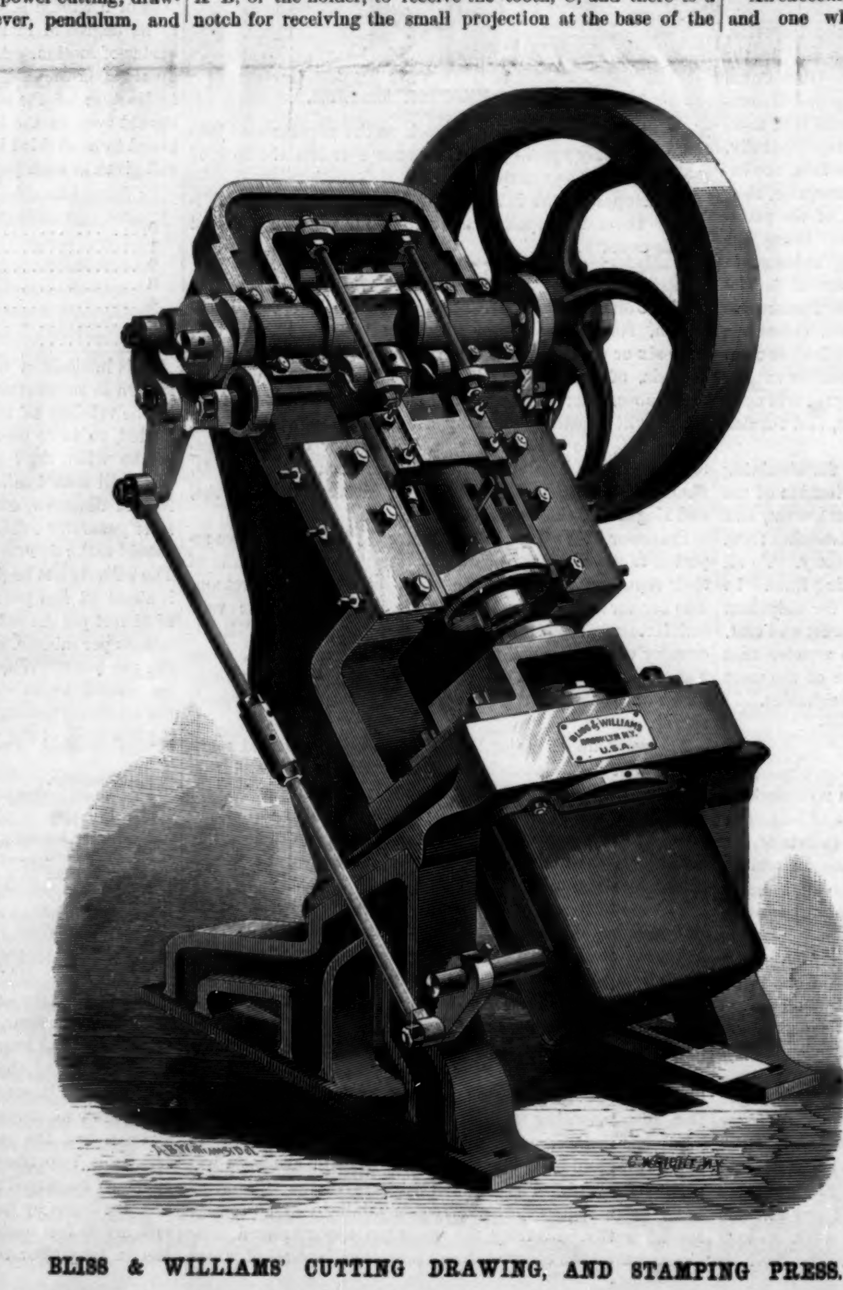
This hydrated oxide is also used with good effect in puddling furnaces, being spread over the bottom, and the iron melted and worked over it.

INCLINE CUTTING, DRAWING, AND STAMPING POWER PRESS.

Nearly every size and description of power cutting, drawing, and double action, also screw lever, pendulum, and drop presses is made by Messrs. Bliss & Williams, of Brooklyn, N. Y. The uses to which these are applicable are very numerous, being employed by manufacturers of house-furnishing wares, sheet iron goods, silver and plated ware, etc. The one represented here is of an entirely new pattern, having been designed especially with a view to insure simplicity, rapidity of action, and the effectual accomplishment at one and the same time of that which has hitherto only been done by two or three operations. As its name indicates, it is for cutting and drawing boxes and many other articles formed from sheet metal.

This press has a new motion that is operated by a cam outside the press, and which actuates the (incased) under slide, upon which is fastened the die or pattern. This die, meeting the punch as it descends, embosses the design on the cover or box, which is at the same time formed by the process of drawing. One operation is thus saved, and the work is performed well and with great accuracy. This press is especially adapted for the formation of sardine boxes, spice box covers and bottoms, blacking boxes and covers for the same, besides many other articles of similar character, with or without embossing or lettering. Work 6 inches in diameter and 1¼ inch in depth can be drawn. When required the press can be arranged to draw 10½ inches in diameter and 1¼ inch in depth. The engraving represents the press to a scale of three quarters of an inch to one foot. The speed of the balance wheel is 60 revolutions per minute; diameter 36 inches, width 5 inches, weight 600 lbs. The total weight of the machine is about 3,300 lbs. The manufacturers have been very successful in the construction of presses for sheet metal work. They received a bronze medal and diploma at the Centennial Exhibition in 1876, and have recently been awarded a gold medal at the Paris Exhibition for the presses exhibited there.

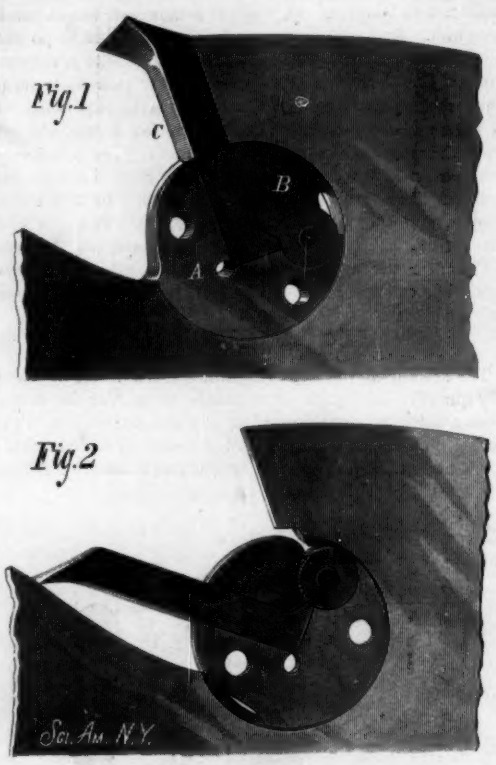
Further information may be had from Bliss & Williams, 167 to 173 Plymouth street, corner of Jay street, Brooklyn, N. Y.



BLISS & WILLIAMS' CUTTING DRAWING, AND STAMPING PRESS.

A NEW INSERTED SAW TOOTH.

Our engraving represents a novel inserted saw tooth recently patented by Mr. Frederick Schley, of 88 Cannon street, New York city. It consists of a circular holder made



SCHLEY'S IMPROVED SAW TOOTH.

in two parts, hinged together, grooved around its edge, and fitted to a circular notch at the base of the saw tooth, the saw plate having a V shaped edge which fits the periphery of the holder. A space is left between the hinged portions, A B, of the holder, to receive the tooth, C, and there is a notch for receiving the small projection at the base of the tooth. This prevents the tooth from drawing out, and it is prevented from lateral motion by a groove in the tooth and a V shaped edge on the holder and saw plate. The tooth is inserted in the holder when it is in the position shown in Fig. 2. It is then raised up into the position shown in Fig. 1.

The tooth is in this manner clamped very tightly, and cannot become accidentally loosened except by a fracture of some of its parts. It will be noticed that the holder (which is shown full size in the engraving) takes up only 1¼ inch of the saw plate, and the entire depth of the tooth is not over 1¾ inch. This is an important saving when the recutting of the saw is considered.

For further particulars address the inventor as above.

A Curious Experience.

In an account of the part played by General Gordon, of the Confederate Army, at the battle of Sharpsburg, Va., where he was wounded five times, the Atlanta *Constitution* says:

"We hear from General Gordon's own lips a story that, in a metaphysical point, is exceedingly interesting. He says that when he fell (struck by a rifle ball in the face) he was utterly incapable of moving. He gradually began to think of his condition, and this is the half dream and half soliloquy that he carried on: 'I have been struck in the head with a six pound solid shot. It has carried away my head. On the left side there is a little piece of skull left. But the brain is gone entirely. Therefore I am dead. And yet I am thinking. How can a man think with his head shot off? And if I am thinking, I cannot be dead. And yet no man can live after his head is shot off. I may have consciousness while dead, but not motion If I can lift my leg, then I am alive. I will try that Can I? Yes, there it is, lifted up! I'm all right.'

"The General says that every stage of this soliloquy is indelibly stamped on his mind, and that in this exhausted state the reasoning was carried on as logically as ever man reasoned at his desk. Doubt succeeded argument and argument displaced doubt just as logically as could be. He says he will never forget with what anxiety he made the test of lifting his leg—with what agony he waited to see whether or not it would move in response to his effort, and how he hesitated before trying it for fear that it might fail and his death be thereby demonstrated."

Accurate Tunneling.

An exceedingly difficult piece of underground engineering, and one which furnishes an admirable illustration of the accuracy of calculation based on scientific principles, has just been completed in Pennsylvania, at the Hampton mine of the Delaware, Lackawanna, and Western Railroad Company. The Scranton *Republican* says: "The mine has been idle for improvements for some time, and the work under notice is the construction of a tunnel in the rock vein, making one slope serve the purpose for which two slopes and a 'dip' were formerly employed, effecting a considerable saving in men, mules, and machinery, and shortening the distance from the scene of the mining operations to the foot of the shaft by at least 2,000 feet. The survey was begun six months ago by Mr. Joseph P. Phillips, Mine Surveyor, under directions of Mr. Snyder, the company's Chief Mining Engineer, and from the outset was attended with the greatest difficulty. Over seven eighths of a mile, principally through old tumble-down workings, had to be surveyed, and 85 sights, at as many different angles, taken before reaching the point opposite the shaft from which operations for the tunnel should be commenced. The most difficult feature was to strike the exact starting point, so that the tunnel, when completed, would be found mathematically correct on grade and point. A variation of a few feet up, down, right, or left would entail additional cost and labor in going over the task to secure uniformity, so that it is not to be wondered at that those responsible for the work regarded it with some anxiety until the workmen met in the middle of the tunnel, and proved the problem to be correct. At least a quarter of a mile of the survey was made through old workings where the roof had fallen in, and in some places the space was no more than two feet high, so that Mr. Phillips and his assistants were compelled to crawl through it. The survey was plotted on a scale of 100 feet to the inch, and the result, when the men who had been tunneling in opposite directions cleared away the last barrier, and met face to

face, was of the most satisfactory character. Every line came out just as it had been computed, and the work was complimented on all sides."

A Good Adhesive Material.

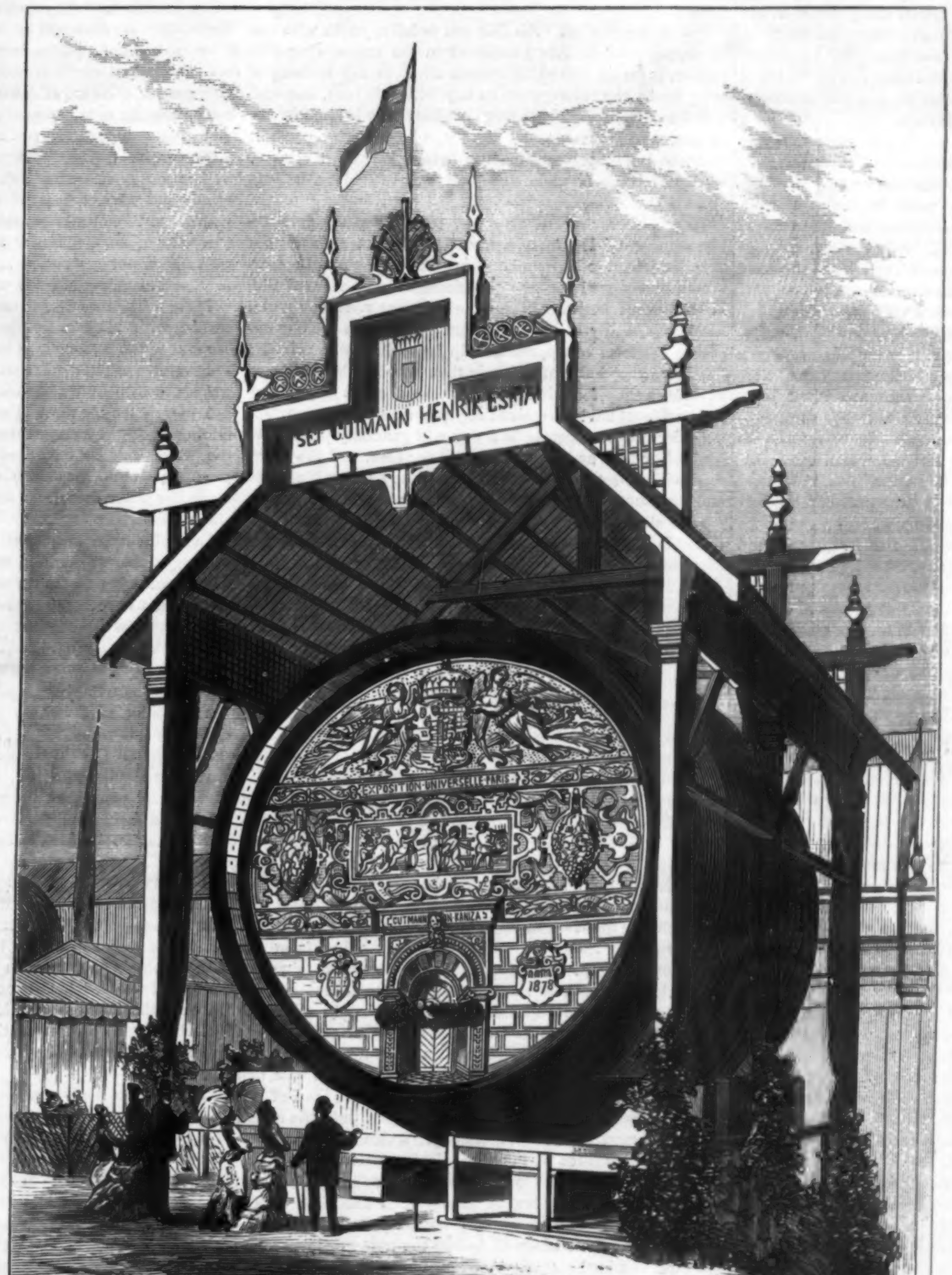
Water, 1 ounce; methylated spirit, 2 ounces; dextrine, 2 tablespoonfuls. Mix the water and spirit; stir in the dextrine, making a smooth paste, and place the vessel you make it in in hot water till a clear brown solution results.

THE GREAT HUNGARIAN WINE CASK.

The great cask of Heidelberg contained 140,000 liters of wine; at the Paris Exhibition of 1878 one was exhibited which is nearly as large, having a capacity of 100,000 liters. The great cask has been sold to a Frenchman, for whom it was made by Mr. Gutmann, of Nozy Kanizsa. It measures 3·65 meters in diameter and 4·30 meters in length.

The staves, which are oak planks from the forests of Hungary, are of 20 to 25 centimeters in thickness, and are held together by 18 iron hoops, the ends of which are firmly riveted together. The door is fastened by a system of screws, and closes the cask, and is similar to manhole covers in boilers. The cask is supported by five logs, each of which is derived from an oak perhaps a thousand years old. This immense cask, with its appendages, would furnish wood enough to stock a small wood yard. It is varnished, and the end in which the large bronze faucet is inserted is carved like a piece of fine parlor furniture. The lower part is laid out to resemble stone masonry. On the left hand side there is a motto praising perseverance and diligence; an escutcheon on the right hand side bears the date 1878. The middle portion of the head is beautifully carved, containing in its center a group drinking and distributing wine. The upper portion bears the Hungarian crown above the Hungarian escutcheon.

This large cask has become the property of a manufacturer of champagne, of Epernay, Mr. Mercier. He will use it for fermenting and storing his wine.



THE GREAT HUNGARIAN WINE CASK AT THE PARIS EXHIBITION.

Big Grape Vines.

California has, probably, 20 vines, each of which produces more than 500 lbs. of grapes as an average crop. Among these are vines at Coloma and Blakes, and near Montecito and Stockton—representing the Sierra Nevada, the coast mountains north of San Francisco, the San Joaquin Valley, the southern coast, the level of the sea, and an elevation of 2,000 feet above it. The Stockton vine, a mile southeast of the town, in the yard of Mr. Phelps' house, is a foot in diameter, and has this year produced 5,000 lbs. (2½ tons), according to the *Independent*. We have heard nothing lately of the yield of the Montecito and Coloma big vines. We saw the latter in 1867 when young, and it then bore 1,500 bunches of grapes. The Montecito vine grew from a cutting of the old big vine at the same place, set out in 1795 and cut down in 1875, when 80 years old. It had a diameter of 15 inches, covered an arbor 114 feet long by 78 wide, and averaged three tons in its annual yield. The big vine at Blakes separates, at the surface of the ground, into two stems, each six inches in diameter. The vine at Coloma is an Isabella; the other three are of the Mission variety.—*San Francisco Alta.*

Men and Machinery.

A census of the industries and handicrafts of Germany, the results of which for Prussia have been drawn up by Dr. Engel, the well known Berlin statistician, shows that in the year 1875 they numbered 1,667,104. Of these, 1,623,591, or 97 per cent, were in the hands of individuals employing at the most five persons, the number employing more than five persons being only 43,513. These 43,513 large industrial undertakings, however, employed 1,379,959 persons—that is, 38 per cent of the whole number of persons engaged in industry, while the remaining 2,246,959 persons were employed in the small industrial undertakings. Dr. Engel finds, on comparing these figures with the corresponding data of 1861, that only those classes of industries have absorbed since then more workmen at the expense of smaller industries of the same kind which from the nature of the work employ large or numerous machines. In other kinds of industry this process of absorption is not marked. This fact is given as an answer to the Socialists, who complain of the tyranny of capital, and assert that it is swallowing up the small industries. In further support of the answer the above figures denote is cited the fact that there were in 1875 no less than 1,266,718 industries which employed no journeymen at all. —*London Times.*

New Inventions.

Messrs Wilson & Keagle, of Center Point, Iowa, recently obtained a United States patent for a Novel Lamp for illuminating large out-door areas, such as skating rinks, depots, wharves, etc., and a Canadian patent has just been issued to them for the same invention.

An improved Station Indicator has been patented by Mr. John Casey, of Jersey City, N. J. This is an improved device, for application to street cars and other railroad cars, to indicate the different cross streets and the stations as they will be successively reached. It is simple and reliable.

An improved Piano Violin has been patented by Mr. Fradelshon Harris, of Louisiana, Mo. This is an improved musical instrument which combines the gamut of the violin with that of the violoncello or bass viol, so as to enable a single performer to simultaneously execute, by means of keys, both parts, which have been heretofore allotted to these separate instruments.

Mr. William Howe, of Brooklyn, N. Y., has patented an improved Folding Hammock Supporter that may be readily carried about and readily set up in position for use; and it consists of three folding sections—a base section and two inclined side sections—that are stiffened by lateral rods and pivoted to supporting legs. The side sections and legs swing on the base section into folded or upright position, the side sections being secured in the latter position on the base section by means of locking devices.

Mr. Rudolf Sieg, of New Orleans, La., has devised an improved Diffusion Apparatus for extracting saccharine matter from sugar cane and other sugar producing substances.

Messrs. Peter Schultes and Christian Walter, of Mendota, Ill., have patented an improved Folding Leg for Sofa Bedsteads. It may be locked securely into position lengthwise along the frame of the swinging section of the sofa bed or lounge, or at right angles thereto, it being rigidly secured so as to prevent rattling and shaking when in use.

An improved Cigar Press has been patented by Mr. J. W. Sursa, of Venice, Ill. It consists of a bench adapted to receive one set of moulds, and provided with means for enabling moulds of different sizes to be used, and furnished with a cam shaft, with which the required amount of pressure is brought to bear on the moulds.

Mr. William T. Keefer, of Newcastle, Pa., has patented a cheap and convenient Device for Stretching and Holding Clothes Lines, and for other similar purposes. The stretching is accomplished by means of a lever, which is retained in position by a rack and pawl. Clothes line props are dispensed with, and the matter of putting up the clothes line is greatly facilitated.

Mr. John C. Banks, of Carlisle, Ky., has devised an improved Filter. This invention relates to that form of filter which is provided with an automatic device for opening a valve to allow the sediment to readily pass away. The weight of the water not only closes the valve, but opens it also.

Messrs. E. D. Smith, C. C. Matson, and P. R. Martin, of Utica, Ill., have patented an improved Toe Weight for Horses, which consists of a weight adapted to rest on the hoof, pivoted to the toe at an angle coincident to that of the hoof, which can be adjusted to the middle of the hoof or to either side, as may be desired.

An improvement in Letters and Numbers for Signs has been patented by Mr. Joseph A. Bruce, of Brooklyn, N. Y. The letters and numbers are made of two or more thin layers of wood with the grain running in different directions, and provided with plates of transparent or opaque glass set in the openings. In some cases the glass is covered with an ornamental scroll work.

Mr. James C. Wright, of Louisville, Ky., has devised an improved form of Counter or Shelving for use in stores or shops, for the purpose of holding clothing and other goods, the construction being such that space is economized, the goods more easily protected, better displayed, and more conveniently accessible, and may also be more quickly removed in the case of fire than when placed on counters and shelves of the usual construction.

Mr. Sylvester Byrne, of Boston, Mass., has devised an improved Washing Machine for heavy fabrics, such as stair cloths, blankets, sheets, rugs, mattress covers, sheetings, and similar articles, which may, by being passed first in one direction, then in the opposite direction through the machine, be cleaned rapidly.

Technical Education and Mechanical Training.

BY OROSCO C. WOOLSON, C. E.

I submit the opinion that there should not be that wide difference of feeling and want of sympathy between the so-called practical man and the so-called scientific man.

What is more discouraging to a man of sound sense and determined energy than to know that he has men about him who are continually pulling in opposite directions? Yet how perfectly cognizant are we that such negativeness, if I may use the expression, does exist, and that, too, among the educated as well as the uneducated classes.

Want of harmony in thought and action is one of the great evils standing in the way of young men becoming good and efficient engineers.

It is impossible for one man to comprehend everything, yet the purely scientific man disregards many things in the construction and proportioning of parts, which the practical man will consider indispensable, not from any particular theory of his own, but from an innate sense of that which is correct. The why and the wherefore he may not be able to explain, yet in actual practice he is right.

These differences among sections of our profession will grow less conspicuous with the advance of education, science, and art. And, however unconscious we may be of the fact, yet we are surely becoming more familiar with each other, just in proportion as we cultivate and interchange ideas with those with whom we are in daily contact, and who are mutually willing to profit by instruction. I feel the good time is coming when the mass of mechanics and miners will be both scientific and practical in a very large sense.

Many of our teachers are not sufficiently practical, otherwise they would point out and explain, more fully than they do, many very scientific and mysterious phenomena, thus educating the mind of the student to recognize if not fully to comprehend them, and in this way not only preparing him to theorize more correctly, but also enabling him to avoid laying himself open to the derision which often follows in case the theorist is proved in error.

The reading and understanding of drawings and the surveying and comprehending of machinery may, perhaps, be compared to the studying and speaking of languages; and in order to illustrate what I wish to convey I will state that a mere theoretical engineer will copy or perhaps construct an elaborate machine on paper, in which full lines and dotted, right lines and circles, are as familiar to him as reading and writing. He can explain the minutest detail of the machine, and how it should go together and how be taken apart; yet place him beside the same machine as it stands completed, and he is bewildered. He can explain to you nothing, it may be, save the general construction, and his ideas of its practical construction are as clear as they would be on the compiling, setting the type, and binding of Homer's Iliad, all of which he may possibly have read, though he never knew absolutely how the work was put together.

On the other hand, show the aforesaid drawing to the hard-fisted mechanic, and it would be as unintelligible to him as Latin or Greek, for to him there is a confusion of many lines worse than any German text; but place him with the machine itself and he feels at home, and will explain to you its construction, dissecting any part in a straightforward mechanical manner, provided the machine has been designed practically and with care.

I call to mind an experience I once had in Chicago, Ill., in which city I was putting in some heavy foundations for machinery soon after the great fire. At that time every man who could work was pressed into service; men were getting high wages, and were constantly striking for either higher figures or fewer hours of labor. Hundreds of mechanics came from other cities, and circumstances conspired to make men arrogant and independent. Many of the men were rough characters, with whom it was necessary to deal firmly, otherwise they would not half work; and not only that, for had they had their own way a very bad example would have been set to those who were disposed to act fairly.

I soon found I had some half dozen in my force that were of the rough sort; one even went so far as to attempt to take my life. This attack aroused my blood, and from that moment onward I never relaxed my will to show them my determination not only not to take the lead, but that they must and should follow my instructions. The result was that long before I was through with that set of men, I could never lift my hand to do anything without their anticipating me; and of all the men I have since been in charge of, I can recall none that were more willing to do my bidding.

Always take the first lift yourself; by so doing you soon impress your men that to be appreciated they must be prompt, which is one of the main elements of success.

Young engineers, make it a point to put your "shoulder to the wheel" first, and soon the laborer will find that you have only to wish, and you are obeyed. I repeat it, don't irritate your men. A boy often receives a fair common school education, and goes into a shop; but by the time his apprenticeship is over, and he is prepared, so far as practical knowledge is concerned, to enter a technical school, his fine sensibilities are blunted, if not gone entirely. In very rare instances will a boy be found who can commence his schooling again with the right enthusiasm.

A condition necessary for obtaining admission to a technical school should be a certain time spent in studying works of practical utility. This desideratum would bring to the school young men of greater determination than are at present to be found in those establishments.

Masters of shops and foundries would object to taking a boy in their employ without obliging him to stay a specified time. This term will certainly be long enough to enable a master to derive some benefit from the boy to compensate the former for the bad and spoiled work of the latter. At the expiration of this period the boy will be so far developed that, should he choose to enter a technical school, he will be better fitted to imbibe those professional tenets which go to polish the engineer; and let the scholar ever bear in mind that the higher the polish the better will he withstand, in after years, the corrosive attacks necessarily incident to his career.

At all times it is a matter of serious consideration for one to choose the proper shops in which to place a boy, in order that he may have ingrafted into his mind those thoroughly practical ideas which will serve him advantageously in the future.

One of the greatest evils that can befall a youth who has the ambition to become prominent in the engineering profession, is to be placed in contact with, to say nothing of being under the tutorage of, an impracticable man, one who is full to overflowing with little whims, who is slack in discipline, who is wanting in dignity, who is never prompt, and who is incapable of placing before his men a class of work which can be understood and appreciated by the public at large.

To procure for a boy, or young man, a thoroughly practical education, first make a close investigation as to the best shops in which to apprentice him. Then pick out the foreman mechanic, whose high qualifications have secured him his important position in the works; place your boy under his charge, and you may rest assured that when the boy has served his term of apprenticeship he will have received a far better knowledge of his trade than if he had been allowed to select a shop for himself, and serve a short apprenticeship, without having received any practical instruction.

Under proper supervision a boy will generally profit both himself and his employer. Reverse the case, and the young man will almost invariably turn out to be a miserable botch and a nuisance, wherever he may chance to be employed.

[The above is extracted from a more lengthy paper published in the *Engineering and Mining Journal* by the author, Mr. Orosco C. Woolson, inspecting engineer on the New York Elevated Railroad. Mr. Woolson has also recently obtained a patent on a flexible railway system, designed to obviate the noise and vibration on our city elevated railroad structures.—ED.]

Driven Wells.

The introduction of driven wells is becoming more general, as the knowledge of their utility and ease of construction become better known. A paper was prepared by Mr. Palmer to be read before the New York State Association, but the author of it did not arrive till the convention had adjourned, so he communicated it to the *National Fireman's Journal*, from which we make the following extract:

At Cortland, N. Y., driven or tube wells for fire purposes are made in the following manner: A wrought iron pipe six inches in diameter is perforated with 864 ⅜ inch holes in rows running lengthwise of the pipe, extending from one end along the pipe about four feet. Care must be taken not to weaken the pipe, and at the same time the combined capacity of the perforation must be somewhat in excess of that of the pipe, to secure a copious supply of water. Into the end of the pipe thus perforated a conical cast iron point is riveted. The point is cast with a shoulder at its base, and the end opposite the apex is inserted into the end of the pipe thus perforated, like a plug or stopper, until the end of the pipe rests against the shoulder, which is made to be flush with the sides of the pipe. This section of the pipe should be 18 or 20 feet long, so as to bring the coupling and joint above the water line in the earth, to facilitate repairs of the joint. The couplings are sometimes spoiled in driving and have to be renewed, before the upper or last section of pipe is added. Great care must be taken to make the well tube and all its joints air tight. A cast iron head is then screwed into the coupling at the other end of the pipe, so that it rests finally upon the end of the pipe, and so as not to bear upon the thread of the coupling in driving. Several wrought or steel nipples are fastened into this head, and a long spanner is used to screw the head firmly to its place in the pipe, and also to turn the tube in the earth to facilitate driving.

With the pipe thus prepared a well is made by digging to water. Into this excavation the pipe is placed in a perpendicular position, point downwards. It is then driven with an ordinary pile driver, using an ordinary wooden weight or hammer. Water is usually reached at a depth of 10 to 16 feet below the surface. The wells are from 22 to 26 feet deep. The sand and mud may be removed from the inside of the well with a sand bucket or dump. A charge of 4 or 5 lbs. of gunpowder is sometimes exploded inside the tube at the bottom of the well, with great benefit. It serves to open the perforations in the pipe which may have become closed in driving, opens up the water courses in the earth, and stirs up the sediment, so that it may readily be taken out of the well by pumping.

Gunpowder is exploded in the bottom of these wells by inclosing it in a water tight metal can, to which a piece of small lead pipe is soldered communicating with the interior of the can. Through this pipe, which must be long enough to bring the open end thereof above the water where the can is submerged, the powder is exploded by means of a fuse or by electricity.

Wells thus constructed have been thoroughly tested. A third class Silsby steam fire engine played upon a fire for seven consecutive hours, throwing two streams through two lines of hose and ⅞ inch nozzles, with no diminution in the volume of water supplied. This well would have supplied the same volume for one year or a longer period. One important advantage which these wells possess is that they never freeze up. The village of Cortland has 12 of them in successful operation, and more are being constructed each year. They now cost from $150 to $175 a piece, ready for use. There are also two gang wells and three dug wells, made and used for fire purposes. The gang wells are made by driving five 1¼ inch tubes made of gas pipe, with points and perforations substantially as heretofore described, to the required depth, namely 20 to 26 feet. These tubes are siamesed by means of elbows, and united in a sort of hydrant, make a serviceable well for fire purposes, but inferior to those constructed with a single 6 inch pipe. The greater number of joints render it more difficult to make them air tight, there is more friction in the tubes, and they are not so readily freed from sand and grit.

Our dug wells (three in number) are superior to the driven wells made by either method, both in the copiousness of the supply and the clearness of the water from grit, but they cost about three times as much each. The best of these has a curbing of stone masonry laid up to the water line without cement and contracted towards the top. In form it resembles a champagne bottle with the neck slightly elongated.

These wells were dug in the primitive way, the sides being curbed with timbers to prevent caving; the earth was brought to the surface in a bucket by means of a windlass. The water was pumped from the pit by a pulsometer, which was claimed to have a capacity of 900 gallons per minute.

A more scientific method would be to sink a caisson containing air tight compartments, from the inside of which the water may be excluded by atmospheric pressure, by pumping air into the caisson under sufficient pressure to exclude the water therefrom while the digging progresses on the inside.

Undoubtedly a good well may also be constructed by driving a five or six inch metal tube, perforated near the bottom and open at the lower end, which may be armed by a steel ring, to protect the tube and facilitate driving. Bits, augers, chisels and sand buckets may be used to loosen and remove the earth from the inside of the tube, which may be driven in the manner heretofore described. The advantages of this method are, that it is not covered by a patent, the character of the strata penetrated may at all times be definitely known, and obstructions in the way of driving can be removed with greater certainty. When the tube is driven to a sufficient depth, and the earth removed from the inside, a plug may be forced down the tube to close the lower end, a conical perforated sheet metal or wire cloth screen may be inserted in the tube to filter the water if desired.

The earth about Cortland is a loose alluvial gravel, mixed with sand and interspersed with cobbles and bowlders. These materials appear to have been deposited in the bed of a lake or stream, rising to within ten to twelve feet of the surface, and forming a subterranean reservoir containing a copious supply of water, which is only slightly obstructed in its flow through this former formation.

Driven wells are impracticable, except when the earth is porous and permeated by copious subterranean reservoirs or streams.

In compact and tenacious clays, unless layers of loose porous earth or gravel are sandwiched between the strata of clay, a practical driven tube well is an impossibility (with no exception that we are aware of), for the reason that, though a dense clay may contain subterranean pools and streams which may be intercepted by driving a tube into the earth; nevertheless, where the earth is so compact as to exclude the air, and thereby relieve the water contained therein from the pressure of the atmosphere surrounding the earth, the water cannot be made to rise in the well tube responsive to the vacuum created therein by the operation of a pump attached to the upper end thereof, and no supply of water can be obtained therefrom by pumping with a suction pump any more than cider can be drawn from an air tight cask without vent to admit the air into the interior of the cask.

Subject to these conditions, tube wells may be so constructed as to afford a ready and economical means of supplying water for the extinguishment of fires.

To Remove Fusel Oil and Clarify Liquors.

A powder is prepared consisting of 30 parts of pure starch, 150 parts of powdered albumen, and 15 parts of sugar of milk. About 7 ozs. of this powder will be sufficient for 2 gallons of liquor, which, when well shaken and allowed to stand for settling, may be decanted free from fusel oil and perfectly clear.

REMEDY FOR COLOR BLINDNESS.—*La France Médicale* states that M. Delbœuf has found that if a person afflicted with Daltonism looks through a layer of fuchsine in solution, his infirmity disappears. A practical application of this discovery has been made by M. Joval, by interposing between two glasses a thin layer of gelatin previously tinted with fuchsine. By regarding objects through such a medium all the difficulties of color blindness are said to be corrected.

INDEX.

ILLUSTRATIONS.

MISCELLANY.

Figures preceded by a star (*) refer to illustrated articles.

TO INVENTORS.

An experience of more than thirty years, and the preparation of not less than one hundred thousand applications for patents at home and abroad, enable us to understand the laws and practice on both continents, and to possess unequaled facilities for procuring patents everywhere. In addition to our facilities for preparing drawings and specifications quickly, the applicant can rest assured that his case will be filed in the Patent Office without delay. Every application, in which the fees have been paid, is sent complete—including the model—to the Patent Office the same day the papers are signed at our office, or received by mail, so there is no delay in filing the case, a complaint we often hear from other sources. Another advantage to the inventor in securing his patent through the Scientific American Patent Agency, it insures a special notice of the invention in the SCIENTIFIC AMERICAN, which publication often opens negotiations for the sale of the patent or manufacture of the article. A synopsis of the patent laws in foreign countries may be found on another page, and persons contemplating the securing of patents abroad are invited to write to this office for prices, which have been reduced in accordance with the times, and our perfected facilities for conducting the business. Address MUNN & CO., office SCIENTIFIC AMERICAN.

Business and Personal.

The Charge for Insertion under this head is One Dollar a line for each insertion; about eight words to a line. Advertisements must be received at publication office as early as Thursday morning to appear in next issue.

The Morehouse Carbureter uses only heavy oils for enriching gas and reduces the consumption about 50 per cent. For rights, address Morehouse, Sage & Shaw, 456 Main St., Buffalo, N. Y.

1,000 2d hand machines for sale. Send stamp for descriptive price list. Forsaith & Co., Manchester, N. H.

Bevins & Co.'s Hydraulic Elevator. Great power, simplicity, safety, economy, durability. 94 Liberty St. N.Y.

Hydraulic Elevators for private houses, hotels, and public buildings. Burdon Iron Works, Brooklyn, N. Y.

Galland & Co.'s improved Hydraulic Elevators. Office 206 Broadway, N.Y., (Evening Post Building, room 22.)

Consumption cured.—An old physician, retired from active practice, having had placed in his hands by an East India missionary the formula of a simple vegetable remedy for the speedy and permanent cure of consumption, bronchitis, catarrh, asthma, and all throat and lung affections, also a positive and radical cure for general debility and all nervous complaints, after having thoroughly tested its wonderful curative powers in thousands of cases, feels it his duty to make it known to his suffering fellows. The recipe will be sent free of charge, to all who desire it, with full directions for preparing and successfully using. Address, with stamp, naming this paper, Dr. J. C. Stone, 146 South Eighth Street, Philadelphia, Pa.

Wanted.—Parties to furnish money to take out valuable patent in foreign countries. No competition. American patent allowed. Geo. W. Stephens, Denison, Iowa.

Foot Lathe, 8½ in. x 3 ft., for sale; also 4 x 5 Upright Engines. G. F. Chappell, 86 Pike St., N. Y.

Wanted.—Foundry that casts small articles of malleable iron. Please send circulars to P. Armstrong, Camden, Wilcox Co., Ala.

It will be to the interest of inventors of Mop Heads to correspond with C. B. Warner, Burlington, Vt.

To Users of Steam.—Hundreds have been deceived by worthless compounds sold by unscrupulous parties for Asbestos Steam Pipe and Boiler Coverings, which have proven unsatisfactory and have cost from 50 to 100 per cent more than the genuine, which are the most effective and economical non-conductors in the world, and are manufactured only by the H. W. Johns Manufacturing Company, 87 Maiden Lane. Be sure and note the address, and send for samples, prices, and estimates of cost of applying, before making contracts.

Interstate and International Mechanical Exchange, 20 E. 13th St., N. Y., U.S.A. A. S. Gear, Manager. An equitable purchasing and selling agency and bureau of practical knowledge. Reliable information concerning machinery, supplies, patents, and employees. Purchases made, sales effected, help furnished.

If you are troubled with leaky valves, use the Chapman. Warranted to give satisfaction. Chapman Valve Manufacturing Company, Boston, Mass.

For Fire or Power Pumps, address the Gould's Manf. Co., Seneca Falls, N. Y., or 15 Park Pl., N. Y. city.

Iron, Brass, and Steel Wire. Needle pointed English Steel Wire, for all purposes. W. Crabb, Newark, N. J.

Rheumatism, Dyspepsia. Cure guaranteed. Brunton's Digestive Fluid and Absorbent, 50c. Dr. Brunton, London, Canada.

For Sale.—A set of Machinery and Tools for making full plate watches; will be sold very low. Address P.O. Box No. 3100, N. Y.

The only Engine in the market attached to boiler having cold bearings. F.F.& A.B.Landis, Lancaster, Pa.

Patentees and Manufacturers of articles of real value desiring the same introduced and sold, address Morehouse, Sage & Shaw, 456 Main St., Buffalo, N. Y.

Brush Electric Light.—20 lights from one machine. Latest & best light. Telegraph Supply Co., Cleveland, O.

The Hancock Inspirator received a gold medal at Paris, as being the best boiler feeder ever made, and the Old Colony Railroad (who have twenty-three machines in constant use) have just given it their unqualified indorsement, as the cheapest and most effective feeder ever used on their locomotives. Those interested are referred to their letter of recommendation, which may be found in our advertising columns.

J. C. Hoadley, Consulting Engineer and Mechanical and Scientific Expert, Lawrence, Mass.

The Lathes, Planers, Drills, and other Tools, new and second-hand, of the Wood & Light Machine Company, Worcester, are to be sold out very low by the George Place Machinery Agency, 121 Chambers St., New York.

For the best advertising at lowest prices in Scientific, Mechanical, and other Newspapers, write to E. N. Freshman & Bros., Advertising Agents, 186 W. 4th St., Cin., O.

For Town and Village use, comb'd Hand Fire Engine & Hose Carriage, $250. Forsaith & Co., Manchester, N. H.

Brick Presses for Fire and Red Brick. Factory, 309 S. 5th St., Philadelphia, Pa. S. P. Miller & Son.

Presses, Dies, and Tools for working Sheet Metals, etc. Fruit and other Can Tools. Bliss & Williams, Brooklyn, N. Y., and Paris Exposition, 1878.

Punching Presses, Drop Hammers, and Dies for working Metals, etc. The Stiles & Parker Press Co., Middletown, Conn.

Hydraulic Presses and Jacks, new and second hand. Lathes and Machinery for Polishing and Buffing Metals. E. Lyon & Co., 470 Grand St., N. Y.

Nickel Plating.—A white deposit guaranteed by using our material. Condit, Hanson & Van Winkle, Newark, N.J.

H. Prentiss & Co., 14 Dey St., N. Y., Manufs. Taps, Dies, Screw Plates, Reamers, etc. Send for list.

Solid Emery Vulcanite Wheels—The Solid Original Emery Wheel—other kinds imitations and inferior. Caution.—Our name is stamped in full on all our best Standard Belting, Packing, and Hose. Buy that only. The best is the cheapest. New York Belting and Packing Company, 37 and 38 Park Row, N. Y.

Nickel Plating.—Wenzel's Patent Perforated Carbon Box Anode for holding Grain Nickel. A. C. Wenzel, 114 Center St., New York City.

Bolt Forging Machine & Power Hammers a specialty. Send for circulars. Forsaith & Co., Manchester, N. H.

For Solid Wrought Iron Beams, etc., see advertisement. Address Union Iron Mills, Pittsburgh, Pa., for lithograph, etc.

To Manufacturers.—Messrs. Bignall & Ostrander, 806-808 N. 2d St., St. Louis, Mo., have added to their present establishment a Machinery Department, from whence the wants of the Western machine-using public will be supplied. Manufacturers will do well to correspond with them.

24 x 48 in. Wright's Automatic Engine, with 16 foot band wheel, 30 in. face, for sale. Price low. Atlas Works, Indianapolis, Ind.

Pulverizing Mills for all hard substances and grinding purposes. Walker Bros. & Co., 23d & Wood St., Phila., Pa.

Inventors' Models. John Ruthven, Cincinnati, O.

The Lawrence Engine is the best. See ad. page 413.

North's Lathe Dog. 347 N. 4th St., Philadelphia, Pa.

Sheet Metal Presses, Ferracute Co., Bridgeton, N. J.

Sir Henry Halford says Vanity Fair Smoking Tobacco has no equal. Received highest award at Paris, 1878.

Wm. Sellers & Co., Phila., have introduced a new Injector, worked by a single motion of a lever.

For Shafts, Pulleys, or Hangers, call and see stock kept at 79 Liberty St. Wm. Sellers & Co.

The Turbine Wheel made by Risdon & Co., Mt. Holly, N.J., gave the best results at Centennial test.

Hand Fire Engines, Lift and Force Pumps for fire and all other purposes. Address Rumsey & Co., Seneca Falls, N.Y., U.S.A.

Hydraulic Cylinders, Wheels, and Pinions, Machinery Castings; all kinds; strong and durable; and easily worked. Tensile strength not less than 65,000 lbs. to square in. Pittsburgh Steel Casting Co., Pittsburgh, Pa.

Cutters shaped entirely by machinery for cutting teeth of gear wheels. Pratt & Whitney Co., Hartford, Conn.

Holly System of Water Supply and Fire Protection for Cities and Villages, is fully described in SCIENTIFIC AMERICAN SUPPLEMENT, No. 140.

Howard's Bench Vise and Schlenter's Bolt Cutters. Howard Iron Works.

Elevators, Freight and Passenger, Shafting, Pulleys, and Hangers. L. S. Graves & Son, Rochester, N. Y.

Diamond Planers. J. Dickinson, 64 Nassau St., N. Y.

Best Wood Cutting Machinery, of the latest improved kinds, eminently superior, manufactured by Bentel, Margedant & Co., Hamilton, Ohio, at lowest prices.

Notes & Queries

(1) J. H. M. asks: What is the best time ever made on a velocipede? A. Ninety miles in 9½ hours is the best time for a long stretch of which we have any knowledge. See SCIENTIFIC AMERICAN, No. 6, current volume.

(2) E. A. S. asks: Can you tell me how the wood of the white oak (*Q. alba*) may be ebonized? A. Immerse the wood for about 48 hours in a hot saturated solution of alum in water, and then brush it over with a logwood decoction as follows: Boil 1 part of best logwood with 10 parts of water, filter through linen, and evaporate at a gentle heat until the volume is reduced one half. To every quart of this add from 10 to 15 drops of a saturated neutral solution of indigo. After applying this dye to the wood rub the latter with a saturated and filtered solution of verdigris in hot concentrated acetic acid, and repeat the operation until a black of the desired intensity is obtained.

(3) W. H. E. writes: I am using oil of cloves to scent lard oil. Can you tell me of a better article, to cost about the same? I would like to have a scent which would smell more like cologne. A. You will find a number of good receipts on p. 1031, SCIENTIFIC AMERICAN SUPPLEMENT, No. 65.

(4) W. W. C. asks: What is the best motive power for driving a No. 2 jeweler's lathe? A. A foot power is undoubtedly the best, but you might use a small water motor or an electric motor.

(5) W. C. E. asks how to prepare what is commonly called millboard or academy board, used by artists. A. *a.* Apply to junk board a coating of size; when dry spread on thick paint with a pallet knife. *b.* Size heavy manila paper, apply to two sheets a thick coat of paint, place the painted sides together, then pull them apart. This will give the board a roughened surface or tooth.

(6) S. B. McC. asks: What number of inches is generally allowed in the measurement of charcoal per bushel? A. The standard bushel contains 2150·42 cubic inches; equivalent in volume to 77·627413 lbs. avoirdupois of distilled water at its maximum density.

(7) C. E. B. asks: What is the process for transferring common wood engravings to wood, so that copies of them may be engraved on the wood block without the labor of drawing them with the pencil? A. Take a saturated alcoholic solution of potash, pour the solution on the engraving, and immediately remove all the superfluous liquid by means of blotting paper. Lay the engraving while damp on the wood or other material to which it is to be transferred, and place it in a press (a copper plate press is the best). The transfer will be obtained immediately. The engraving must be immersed in clear cold water after removal from the potash bath. Wooden blocks must be moistened on the back to prevent warping.

(8) F. H. M. asks for a good practical way for tempering small taps and reamers. A. Heat them to a low red in a charcoal fire, plunge in cool (not cold) water; draw the temper to a dark straw color by holding the tap in an alcohol or gas flame, or in a piece of gas pipe heated to redness.

(9) G. W. C. asks (1) why a cannon ball when shot up perpendicularly from the earth does not have the same velocity or force in coming down as in going up. A. The difference in velocity is due to the resistance of the air. 2. If shot up in a vacuum would not the ball returning strike the cannon's mouth with a force equal to that which it had when it started? A. Yes. 3. Is not the resistance of the air greater in the downward course of the ball than in the upward? If so, does not the fact of the air being between the weight of the ball and the earth make the air in a measure compressed or more dense? A. We think not, perceptibly.

(10) C. A. R. writes: I have been informed that Lake Superior has a tide which rises and falls the same as the ocean tide. Is this so? A. Lake Superior has no tide; though level of water varies with the wind, possibly by other unexplained causes.

(11) H. J. M. writes: I have a great desire to understand and to study electricity. 1. What are the best books on the subject? A. A beginner should study some good elementary work on physics. Ganot's 'Physics" can be recommended. Prescott's "Electricity and the Electric Telegraph" is a good work. 2. Will a piece of thin common tin do to make a diaphragm for a telephone or a phonograph? A. Yes.

(12) H. H. writes: I wish to heat a room 40 x 60 feet, situated 10 feet below a 40 horse power boiler. If I connect one end of the system of heating pipes with the steam dome, and the other end with the boiler below water line, will the water from condensed steam find its way back into the boiler by the attraction of gravitation? A. It will be necessary to use a pump or boiler feeding trap.

(13) F. J. K. asks whether there is a gratuity or prize offered in France or elsewhere to any one who first squares the circle. A. No.

(14) C. E. B. asks if steam will pass through a coiled pipe with greater force than it will through a straight one. A. No.

(15) E. H. writes: I have an engine 2¼ bore by 6 inches stroke. Will it run a boat 17 feet long in still water? A. We think it will answer.

(16) S. H. G. asks if nickel is mined, or is it a composition. A. Nickel is an elementary substance. It does not occur native but in combination with other substances, as arsenic, antimony, and sulphur, and associated with cobalt, copper, iron, manganese, etc.

(17) E. F. writes: I have a copper evaporator or air moistener, placed against the pipe of a stove in a living room. On the sides of this considerable verdigris collects. Will any of this verdigris pass off in the vapor so as to be injurious to health? A. No; copper salts are not volatile under such conditions.

(18) G. S. writes: If two cubic feet of air at atmospheric pressure are compressed to one cubic foot, what will be the pressure per square inch? Also having one cubic foot of compressed air at 60 lbs. per square inch, how many pounds will it raise one foot high if all the power in it is expended? I want the pressure above atmosphere, or what would show on a steam gauge. A. Supposing the air to expand or be compressed, at constant temperature, the pressure varies inversely as the volume, and the mean pressure during expansion, calling R the ratio of expansion, and P the initial pressure, is $\frac{P \times \text{hyp. log. } R}{R}$.

(19) W. T. S. asks: What is properly termed back pressure? A. The pressure opposed to the motion of the piston.

(20) F. E. M. writes: I have a boat 50 feet long by 9 feet beam, drawing 3 feet of water; my engine is 8¼ (dia.) x 7¾ (stroke) inches, with a light link motion. Is the engine large enough to drive the boat 12 miles an hour with a suitable sized wheel? What size wheel would you recommend? What size boiler? Would running the engine high or low pressure make any difference in speed? A. Make a propeller 3 feet in diameter and 4 feet pitch—boiler with about 250 square feet of efficient heating surface. It will be necessary to carry a high pressure of steam to make the speed you desire.

(21) A. C. writes: 1. I am building a tank to run a Backus water motor: how many feet square and high shall I make it to get from 40 to 60 lbs. pressure? A. Each foot in height produces a pressure of about 0·433 pound per square inch. 2. How fast should a drag saw run to saw successfully? I want to attach one to my horse power (for thrashing). Would it run too fast? A. We think this will answer very well.

(22) C. P. B. asks: What is the best flux to use in welding steel on to cast iron, our object being to weld a thin steel on to the cast iron jaw of a vise in the process of manufacture? A. Powdered anhydrous borax or boracic acid mixed with twice its weight of anhydrous sodium carbonate is among the best.

(23) F. S. writes: A communication in your journal of the date of 9th ult., having reference to the performance of small steam yachts, leads me to mention the fact that last spring I built a yacht, 25 feet long, 4 feet 9 inches beam. The frame of oak, sawn to form, 1¼ inch square, and planked with ⅝ pine and calked. She has a boiler 3 feet high, and 2 feet 2 in. diameter, firebox 1 ft. 8 in. high and 1 ft. 11 in. diameter, with 49 2-inch tubes. The engine is one of S. M. Maxim's 3 x 3 inches, same as the Flirt (after which I called mine); the wheel is three bladed, 22 in. diameter, 2 ft. 6 in. pitch. The speed attained was very good, she having made a straight run of 56 miles in six hours and a quarter. This, of course is not a simple spurt of a mile or two, and therefore is a better test of her running capacity. I might also mention that our river is very much obstructed by refuse from the saw mills, in some places the cuttings and sawdust are several inches thick and somewhat interferes with the speed as well as choking the pump; then again the blocks sometimes get into the wheel, as they did on the occasion mentioned, and twice brought the engine to a sudden stand, thereby straining the engine. She ran under an average pressure of 100 lbs. She was well loaded, having fuel for a journey of 160 miles, as well as 3 men on board. [We are glad to receive letters like this, and hope that other readers having steam launches, whose performance is satisfactory, will send us particulars.—ED.]

(24) H. S. asks: If I add cane sugar to the grape juice in order to make the wine sweet, is the wine still a natural wine? A. Wines are subject to various causes of deterioration, termed maladies, one of which is the "souring." This defect, if not excessive, is overcome by the addition of sugar, and does not constitute the wine an artificial one. The sugar in this case simply dissolves without change.

(25) O. K. asks: Is there such a thing as nitrate of oxygen? A. We know of no such compound. 2. Can you tell me what two gases combined will make an explosive liquid? A. Nitrogen chloride is formed by the reaction of chlorine and ammonia, both of which are gases when dry. For its preparation see p. 219 (16), current volume, SCIENTIFIC AMERICAN.

(26) Will M. G., M.D., send his P. O. address?

(27) F. H. P. asks (1) what the small paper caps (explosive) used by boys on toy pistols are made from. A. Usually a mixture of finely powdered potassium chlorate and sulphur with a little sugar or charcoal. 2. Can they be made to explode by piercing with a sharp pointed instrument? A. Yes; the mixture for igniting the cartridges of the needle gun consists either of potassium chlorate and black sulphide of antimony, or a compound containing fulminate of mercury. The following is a good preparation: Potassium chlorate, 16 parts; black sulphide of antimony, 8 parts; flour of sulphur, 4 parts; charcoal powder, 1 part; moistened with gum or sugar water and a very little dilute nitric acid (a few drops) added. The mixture is ignited by the friction produced by the sudden passage of the needle through it.

(28) A. S. H. asks: Can wood be ignited by steam? A. Under ordinary circumstances it cannot.

(29) W. B. P. asks for a recipe for deodorizing kerosene oil. A. The oil cannot be completely deodorized, but the characteristic odor may be somewhat cloaked by the addition of strongly scented substances or perfumes. The odors may also be rendered less objectionable by agitating the oil for some time with about 20 per cent of good (moist) chloride of lime—bleaching powder—and then with a little dry calcium chloride.

(30) J. L. J. asks: Of what is phosphor bronze made? A. To bronze containing 90 to 91 per cent of copper and 9 to 10 per cent of zinc is added, while in the pot, and just before cooling, from one half of one to two per cent of phosphorus wrapped in a little paper and quickly forced to the bottom of the pot. In a few minutes the alloy is ready for casting. Care is necessary in handling and adding the phosphorus to avoid accident.

(31) J. L. W. asks how aneroid barometers are compensated for temperature. A. A small thermometer is generally attached to each instrument; from its indications a correction is made for temperatures according to an empirical scale specially constructed for each instrument.

(32) J. W. B. asks if a practical civil engineer (not having received the degree of "C. E." from any college) has a right, or is it lawful, to put "C. E." after his name. A. Such a person, in our opinion, only uses the title by courtesy, and not by right, legal or otherwise.

(33) B. L. asks: 1. What is the average annual rain fall in New York State? A. 36 to 40 inches. 2. In what places in the United States and Canada is Prussian blue manufactured? A. In New York city; we do not know that it is made in Canada. 3. What is the origin of the light in the voltaic arc? A. Some physicists attribute it to a succession of very bright sparks passing from one carbon to another; others, to the incandescence of particles of carbon.

(34) L. B. P. asks which side of a belt should run in contact with the pulley. A. You can transmit more power, and the belt will wear better, if you run it with the surface or smooth side to the pulley.

(35) W. G. asks: With what can I fill cracks in a hard finished wall? A. Plaster of Paris mixed into a paste with cold water and about ¼ part of fine sharp quartz sand answers very well. A little alum water is often added to prevent the mixture setting too quick.

(36) H. D. asks how to make serpents' eggs. A. To solution of ammonium sulphocyanate, add mercuric nitrate solution; thoroughly wash and dry the white precipitate of mercuric sulphocyanate, make it into small cones, and dry these at a gentle heat. These are the so-called serpents' eggs. For details concerning the economic manufacture of sulphocyanates, see pp. 152 and 581 *Pharmaceutical Journal*, 2d series, vol. vii.

(37) J. A. W. asks (1) how the composition used for pads in post offices may be made. A. Take a piece of inch board previously planed smooth, 5 inches square, cut pieces of very heavy cashmere goods the same size, and place them in layers, say an inch deep, on the block, and smear the ink on alternate layers of the cloth. Then sew over all a piece of the same cloth, tacking around the outside edges of the block to hold the outside cloth firm. 2. In the office at New York a pad is made with the felt stuck on to the gum composition; how is it done? A. A hot solution of gelatin in glycerin is used, we are informed.

COMMUNICATIONS RECEIVED.

The Editor of the SCIENTIFIC AMERICAN acknowledges with much pleasure the receipt of original papers and contributions on the following subjects:

Lubricating and Lubricators. By E. F. Dieterichs.
Baking Powder. By C. B.

[OFFICIAL.

INDEX OF INVENTIONS

FOR WHICH

Letters Patent of the United States were Granted in the Week Ending

October 29, 1878,

AND EACH BEARING THAT DATE.

[Those marked (r) are reissued patents.]

A complete copy of any patent in the annexed list, including both the specifications and drawings, will be furnished from this office for one dollar. In ordering, please state the number and date of the patent desired, and remit to Munn & Co., 37 Park Row, New York city.

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Box, M. L. Weller	10,885, 10,886
Carpet, W. McCallum	10,888
Carpet, E. Pyne	10,889
Coffin plates, W. C. Beattie	10,884
Coffin plate, A. Fatoux	10,890 to 10,902
Funeral ornament, C. H. Learned	10,881
Ornamentation of glassware, H. Franz	10,887
Pencil cases, J. M. Clark	10,880
Stick candy, G. M. Mills	10,882, 10,883

English Patents Issued to Americans.

From November 15 to November 29, inclusive.

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Box for powders.—W. H. Hall, N. Y. city.
Chair.—J. B. Underwood *et al.*, Fayetteville, N. C.
Electric lamp.—W. E. Sawyer *et al.*, N. Y. city.
Electric light.—W. E. Sawyer *et al.*, N. Y. city
Glass machinery.—J. P. & C. C. Colne, Washington, D. C.
Sewing machines.—F. Curtis, Boston, Mass.
Spinning machinery.—J. Good, Brooklyn, N. Y.
Steam boilers.—S. J. Gold *et al.*, Cornwall, Conn.
Steam engine.—Pneumatic Tramway Engine Company, N. Y. city.
Stove.—W. A. Greene, Elizabethport, N. J.
Sugar, manufacture of.—W. R. Elmenhorst, Jersey City, N. J.
Suspenders.—T. Potter, Boston, Mass.
Tables.—S. Vanstone *et al.*, Providence, R. I.
Telegraph cables.—M. H. Alberger *et al.*, Phila., Pa.
Valve seats.—H. Watkeys, Syracuse, N. Y.

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Inside Page, each insertion - - - 75 cents a line.
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Engravings may head advertisements at the same rate per line, by measurement, as the letter press. Advertisements must be received at publication office as early as Thursday morning to appear in next issue.

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"**THE OLD MASTERS**," a series by CLARENCE COOK, begins with "**Leonardo da Vinci.**" Among the masterpieces reproduced are the "Last Supper," "Head of Christ," and the "Mona Lisa."

The three last papers are in the January number.

"**OLD MARYLAND MANNERS**," portraying the quaintness of Maryland 150 years ago, illustrated by the author, is also in January.

SIDNEY LANIER contributes a series, "**The New South;**" ALLAN C. REDWOOD, of Baltimore, a lighter series, "**The Johnny Reb' Papers,**" illustrated by the author, begun in November. BOYESEN will have articles on "**The Universities of Europe,**" including sketches of leading men in the noted Universities of Great Britain and the Continent. Among other papers may be mentioned **American and Canadian Sports, Farm Life, "Caves and Cave Scenery," "Lawn Planting for Small Places," American Art and Artists, American Archaeology, Modern Inventors** (begun with Edison), etc., etc.

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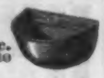

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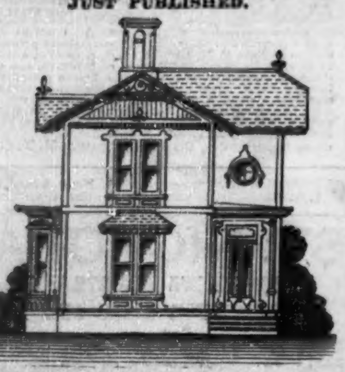

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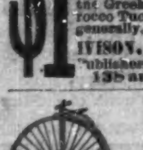

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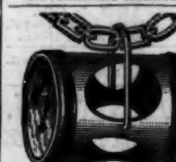

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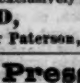

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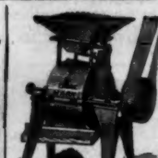

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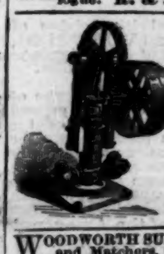

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